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ABSTRACT

Developed during the 1976-77 school year to assist Washington grade 7-8 teachers in small school districts with the improvement of curriculum and instruction, this learning-objective-based curriculum suggests activities, monitoring procedures and resources for mathematics. Introductory materials describe the organization of Small School materials, relationship to Washington's Student Learning Objectives (SLO) Law, format of the curriculum guide, definitions of format terms, goals for the Washington Common Schools, mathematics program goals and the K-8 mathematics curriculum scope. The scope of the grade 7-8 curriculum includes whole numbers (addition, subtraction, multiplication, division and story problems); integers; rational numbers (common fractions, ratios, percentage, proportion and decimals); real numbers; algebraic expression; numeration (number theory, scientific notation and exponents); geometry (two- and three-dimensional shapes, points, lines, line segments, angles, triangles, circles, perimeter, area and volume); graphs; probability and statistics; and measurements (time, linear, capacity, weight, temperature and maintenance of English measurement). (NEC)

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SMALL SCHOOLS

MATHEMATICS CURRICULUM

GRADES 7-8

Reading · Language Arts · Mathematics · Science · Social Studies

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Dr. Frank B. Brouillet, State Superintendent of Public Instruction, Olympia, Washington

SMALL SCHOOLS

MATHEMATICS CURRICULUM

7-8

Scope

Objectives

Activities

Resources

Monitoring Procedures

[1977]

This is a publication of the Instructional and Professional Services Division of the Superintendent of Public Instruction, Olympia, Washington.

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APPRECIATION

Many educators have been involved in the development of the Small Schools curriculum materials. Of these, Robert Groeschell, now retired from the office of the State Superintendent of Public Instruction, deserves special recognition of his insight, leadership and support in initiating the Small Schools Curriculum Project.

In order to provide assistance to small school districts, a curriculum assessment was conducted by Mr. Groeschell in the spring of 1975. The findings of this assessment pointed out the need for the development of curriculum guidelines to assist small districts in identifying learning objectives and in planning for program implementation. These findings were used to provide the basis for originally funding the Small Schools Curriculum Project.

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INTRODUCTION

The Small Schools materials were developed through the cooperative efforts of three levels of educational organizations: local, regional and state. Forty primary teachers and ten elementary principals from small districts in Snohomish and Island Counties (Arlington, Darrington, Granite Falls, Lake Stevens, Lakewood, Monroe, Snohomish, Stanwood, Sultan, South Whidbey and Monroe Christian School), developed and sequenced student learning objectives for grades kindergarten through third in five curriculum areas: reading, language arts, mathematics, science and social studies and for grades four through six in three curriculum areas: reading, mathematics and language arts. Suggested activities, monitoring procedures and resources used in teaching the objectives were identified and each student learning objective was correlated to the State Goals for Washington Common Schools and to broad program goals. Educational Service District 189 and the office of the Superintendent of Public Instruction provided technical assistance, organizational leadership and editorial and publication services to the districts. Curriculum specialists from Washington colleges, universities and local school districts also assisted with the development of materials.

On the following pages you will find a portion of the Small Schools Curriculum. Included are student learning objectives, suggested activities, monitoring procedures and resources for Mathematics. These materials were developed during the 1976-77 school year.

ORGANIZATION OF THE SMALL SCHOOLS MATERIALS

Book covers and objective pages for all Small Schools materials have been color-coded for each subject: Reading--green, Language Arts--yellow, Mathematics--blue, Social Studies--buff and Science--pink. Following each colored objective page there are several pages which identify activities, resources and monitoring procedures which may be used when teaching to the objectives. See pages viii and ix of this book for more detailed explanation of the format. On those objective pages all objectives for an area of the scope are identified. Within each curriculum book the objectives have been correlated to the Goals for the Washington Common Schools and to the Small Schools Program Goals for that subject area.

RELATIONSHIP TO THE SLO LAW

The purpose of this book and all other Small Schools materials is to assist teachers with the improvement of curriculum and instruction. In addition, it is expected that many smaller districts lacking curriculum personnel will find this book helpful in complying with the SLO Law. (This Law requires districts to identify student learning objectives and to evaluate each student's performance related to the attainment of the objectives.) Contained within this book are many more objectives than any district would choose to identify as their SLO objectives. In order to provide districts with assistance in identifying objectives which might compose their SLO list, selected objectives are marked with an asterisk (*). These objectives have been selected with the understanding that they serve only as a model when using the Small Schools materials in helping districts to meet the requirements of the SLO Law.

For more information concerning the SLO Law, see the Handbook for School District Implementation of the Student Learning Objectives Law available from the office of the State Superintendent of Public Instruction.

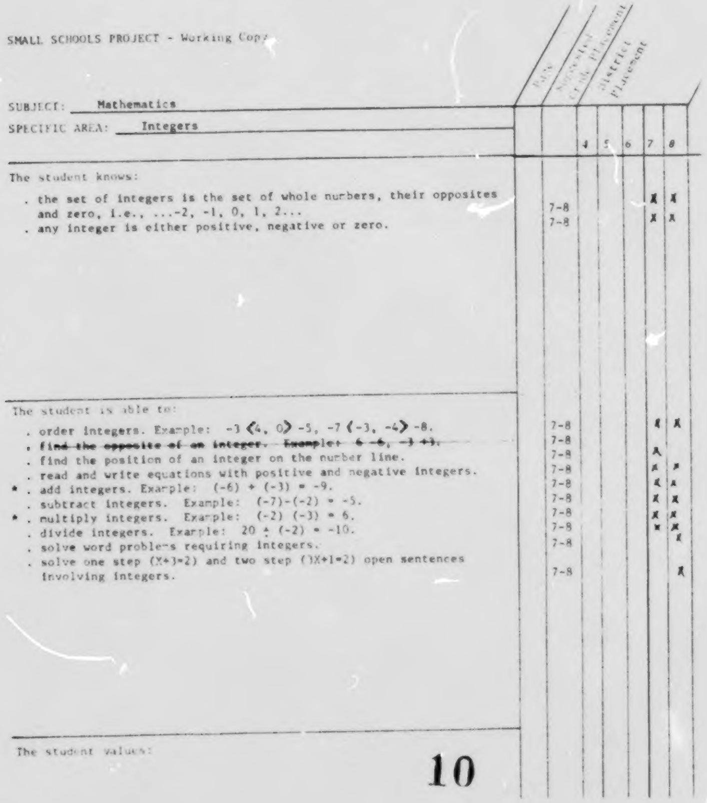
FORMAT

One unique feature of the Small Schools Curriculum is the format arrangement of information on the page. The format was developed in order to facilitate the transportability of the product by allowing districts to personalize the curriculum materials to meet their own educational programs. The Small Schools Format provides a simple arrangement for listing objectives and identifying activities, monitoring procedures and resources used in teaching.

Page One

The first format page lists the sequence of student learning objectives related to a specific area of the curriculum for either reading, language arts, mathematics, science or social studies. For each objective a grade placement has been recommended indicating where each objective should be taught and mastered. The grade recommendation is made with the understanding that it applies to most students and that there will always be some students who require either a longer or shorter time than recommended to master the knowledges, skills and values indicated by the objectives.

Columns at the right of the page have been provided so district personnel can indicate the grade placement of objectives to coincide with the curriculum materials available in their schools. District personnel may also choose to delete an objective by striking it from the list or add another objective by writing it directly on the sequenced objective page.



SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Mathematics

SPECIFIC AREA: Integers

	Date	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. the set of integers is the set of whole numbers, their opposites and zero, i.e., ...-2, -1, 0, 1, 2...		7-8				X	X
. any integer is either positive, negative or zero.		7-8				X	X
The student is able to:							
. order integers. Example: -3 < 4, 0 > -5, -7 < -3, -4 > -8.		7-8				X	X
~~. find the opposite of an integer. Example: 6 -6, -3 +3.~~		7-8					
. find the position of an integer on the number line.		7-8				X	
. read and write equations with positive and negative integers.		7-8				X	X
* . add integers. Example: (-6) + (-3) = -9.		7-8				X	X
. subtract integers. Example: (-7)-(-2) = -5.		7-8				X	X
* . multiply integers. Example: (-2) (-3) = 6.		7-8				X	X
. divide integers. Example: 20 ÷ (-2) = -10.		7-8				X	X
. solve word problems requiring integers.		7-8					X
. solve one step (X+3=2) and two step (3X+1=2) open sentences involving integers.		7-8					X
The student values:							

10

Page Two

On the second format page, one or more objectives from the first format page are rewritten and suggested activities, monitoring procedures and possible resources used in teaching to the objective(s) are identified. The objectives are correlated to the State Goals for Washington Common Schools and to broad K-12 program goals. The suggested grade placement of the objectives and the activities is indicated and, wherever applicable, the relatedness of an objective to other curriculum areas have been shown.

Below is an example of a completed second format page. Teachers and principals in local districts may personalize this page by listing their own resources and by correlating their district goals to the student learning objectives.

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows any integer is either positive, negative or zero. B. The student is able to multiply integers. Example: (-2) (-3) =6. C. The student is able to divide integers. Example: 20 ÷ (-2) =¯10.

State Goal	1, 10
District Goal	
Program Goal	2,3,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Multiplication/Division Bingo
Group Size: entire class
Materials: bingo game board as shown below, marker, multiplication and division problems with positive and negative integers

Procedure(s):

- The caller reads the multiplication and division problems with positive and negative integers.
- For example, one card might read "N — negative 5 times negative 6." Cell N 2 has + 30 or ¯5 • ¯6 on it. A marker is placed on that cell.
- A second card might read "G — negative 12 divided by negative 3." Cell G 5 has + 4 or ¯12 ÷ 3 on it.
- The first player who covers a horizontal, vertical, or diagonal straight line wins.

Sample card:

1	¯4	+1	¯5	+2	+12
2	¯9	0	+30	+22	¯7
3	+8	+19	FREE	¯3	¯16
4	+36	¯10	¯21	¯14	¯1
5	+6	+11	¯25	+4	¯27
	B	I	N	G	O

Suggested Monitoring Procedures

Give students a worksheet with multiplication and division problems involving integers. Correct and group students needing additional assistance.

Possible Resources

District adopted text.

District Resources

DEFINITION OF FORMAT TERMS
Small Schools Curriculum Project

Subject indicates a broad course of study. The subject classified the learning into one of the general areas of the curriculum, i.e., reading, mathematics, social studies.

Specific Area indicates a particular learning category contained within the subject. Within the subject of reading there exist several specific areas, i.e., comprehension, study skills, word attack skills.

State Goal indicates a broad term policy statement relating to the education of all students within the State of Washington. In 1972, the State Board of Education adopted 10 State Goals for the Washington Common Schools.

District Goal generally reflects the expectations of the community regarding the kinds of learning that should result from school experience. These goals are employed mainly to inform the citizenry of the broad aims of the school. When district goals are correlated to student learning objectives, community members are able to see how their expectations for schools are translated daily into the teaching/learning process of the classroom.

Program Goals are K-12 goals which do not specify grade placement. These goals provide the basis for generating subgoals or objectives for courses or units of study within a subject area. Program goals are used as a basis for defining the outcomes of an entire area of instruction such as mathematics, language arts or social studies.

Student Learning Objective

Three major types of learning objectives which have been identified are knowledge, process and value objectives.

Knowledge Student Learning Objectives identify something that is to be known and begins with the words, "The student knows..." Knowledge objectives specify the knowledge a student is expected to learn. These objectives include categories of learning such as specific facts, principals and laws, simple generalizations, similarities and differences, etc.

An example of a Knowledge Student Learning Objective is: "The student knows guide words in a dictionary indicate the first and last words on the page."

Process Student Learning Objectives identify something the student is able to do, and begins with the words, "The student is able to..." These objectives are associated with the rational thinking processes of communication, inquiry, problem solving, production, service and human relationships.

An example of a Process Student Learning Objective is: "The student is able to associate a consonant sound with the letter name."

Definition of Format Terms
continued

Value Student Learning Objectives identify only the type of values which foster the context of the discipline. These objectives are thought to be most uniformly and consistently approved by society as supporting the major aims of the discipline.

An example of a Value Student Learning Objective is: "The student values reading as a worthwhile leisure time activity."

Suggested Learning Activities describe the behavior of both the teacher and students. The instructional strategies employed by the teacher, as well as the activities undertaken by the students, are included in this section. Each activity includes materials, group size and procedures.

Suggested Monitoring Procedures indicate informal methods for determining the progress a student is making towards the attainment of the objective. These methods include techniques such as teacher observation, student interest and attitude surveys and recording results of classroom instruction.

Possible Learning Resources indicate materials, teacher made or commercially produced, which are needed by both the teacher and students in order to accomplish the learning activities.

* * * * * * * * * * * * * * *

Appreciation is extended to Dr. Charles Murray, Superintendent, and the staff of ESD 189 for providing meeting space, equipment and resources which facilitated the development of the Small Schools Curriculum materials.

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* * * * * * * * * * * * * * *

GOALS FOR THE WASHINGTON COMMON SCHOOLS

1. As a result of the process of education, all students should have the basic skills and knowledge necessary to seek information, to present ideas, to listen to and interact with others, and to use judgment and imagination in perceiving and resolving problems.
2. As a result of the process of education, all students should understand the elements of their physical and emotional well-being.
3. As a result of the process of education, all students should know the basic principles of the American democratic heritage.
4. As a result of the process of education, all students should appreciate the wonders of the natural world, human achievements and failures, dreams and capabilities.
5. As a result of the process of education, all students should clarify their basic values and develop a commitment to act upon these values within the framework of their rights and responsibilities as participants in the democratic process.
6. As a result of the process of education, all students should interact with people of different cultures, races, generations, and life styles with significant rapport.
7. As a result of the process of education, all students should participate in social, political, economic and family activities with the confidence that their actions make a difference.
8. As a result of the process of education, all students should be prepared for their next career steps.
9. As a result of the process of education, all students should use leisure time in positive and satisfying ways.
10. As a result of the process of education, all students should be committed to life-long learning and personal growth.

MATHEMATICS PROGRAM GOALS
(K-12)

1. The student values the study of mathematics for its usefulness and application to everyday life.

2. The student develops the ability to communicate with precision and confidence using the vocabulary and symbols unique to mathematics.

3. The student develops the concept of number and numeration including counting, place value, reading and writing numbers, various numbering systems, number theory and scientific notation.

4. The student develops general mathematical concepts of time-space relationships; equality-inequality; measurement; function; graphs, charts and tables; probability and statistics; and geometry.

5. The student develops accuracy in using the computational skills of adding, subtracting, multiplying and dividing.

6. The student develops the ability to use problem-solving techniques.

7. The student develops the knowledge and use of the structure of mathematical systems and real numbers.

8. The student knows and is able to use the symbols, elements, operations and structure of the following number systems: whole numbers, integers, rational numbers, real numbers and complex numbers.

MATHEMATICS
SCOPE (K-8)

I. WHOLE NUMBERS

A. Counting (Serial, Objects, Order) -- K-3 ....
B. Equality and Inequality -- K-6 ....
C. Reading and Writing Numerals -- K-6 ....
D. Place Value -- K-6 ....
E. Addition -- K-8 1
F. Subtraction -- 1-8 9
G. Multiplication -- 3-8 13
H. Division -- 3-8 21
I. Story Problems -- 2-8 29

II. INTEGERS -- 7-8 41

III. RATIONAL NUMBERS

A. Common Fractions -- K-8 69
B. Ratios, Percentage, Proportion -- 6-8 99
C. Decimals -- 6-8 123

IV. REAL NUMBERS -- 7-8 143

V. ALGEBRAIC EXPRESSION -- 7-8 155

VI. NUMERATION

A. Number Theory -- 4-8 171
B. Scientific Notation, Exponents 193

VII. GEOMETRY

A. K-3 ....
B. Two-Dimensional Shapes -- 4-8 209
C. Three-Dimensional Shapes -- 4-8 217
D. Points, Lines, Line Segments -- 4-8 221
E. Angles, Triangles -- 5-8 233
F. Circles -- 4-8 247
G. Perimeter -- 4-8 251
H. Area -- 6-8 261
I. Volume -- 7-8 279

VIII. GRAPHS -- K-8 291

IX. PROBABILITY AND STATISTICS -- 4-8 301

X. MEASUREMENTS

A. Time -- K-8 307
B. Money -- 1-6 313
C. Linear -- 4-8 315
D. Capacity -- 4-8 319
E. Weight -- 4-8 323
F. Temperature -- 3-8 331
G. Maintenance of English Measurement -- 4-8 337

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SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Mathematics

SPECIFIC AREA: Whole Numbers: Addition

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. addition is the combining of numbers.		K-1					
. an addend is one of a set of numbers to be added. ④+②+③= 9		1-3					
. a sum is the total of all addends.		1-3					
. that adding zero to a number does not affect the sum.		1-2					
. the addition facts with sums to nine (mastery)		1-2					
*. the addition facts with sums to 18. (mastery)		2-3					
. that the order in which two numbers are added does not change their sum (commutative property), i.e, 3+5 = 8 or 5+3 = 8.		2-3					
. when adding three or more numbers the way addends are grouped does not affect the sum (associative property), i.e., (1+2) + 4 = 1 + (2+4).		1-3					
. and maintains skills and basic facts of addition taught in primary grades (see Mathematics, Addition K-3).	3	4-8					
The student is able to:							
*. add two two-digit numbers without renaming (carrying), i.e., 21 + 32 = 53.		1-2					
. add three or more one-digit numbers.		1-2					
. add two three-digit numbers without renaming (carrying), i.e., 123 + 234 = 357.		2					
. add three or more two-digit numbers with a sum of less than 100 without renaming (carrying)., i.e., 21+23+14 = 58.		2-3					
*. add any numbers with two or more digits that require renaming (carrying), i.e., 26+48 = 74.		2-3					
. add any three or more two-digit numbers, i.e., 39+65+87+88 = 279.		3-4					
. add any two or more three-digit numbers with renaming.		3-4					
*. add any two or more four-digit numbers with renaming.		3-4					
*. complete any addition problems in either horizontal or vertical form.	3	5-6					
. estimate sums using the concepts of "greater than" and "less than" (140 + 90 > 200 or < 250).	7	5-6					
The student values:							
. the quick and accurate recall of basic facts.	3	4-8					

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OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______________

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows and maintains skills and basic facts of addition taught in primary grades (see Mathematics, Addition K-3). B. The student is able to complete any addition problems in either horizontal or vertical form. C. The student values the quick and accurate recall of basic facts.

Related Area(s)

State Goal	1,8
District Goal	
Program Goal	2,3,5

Suggested Activities: Grade(s) 7-8

Title: Football

Group Size: entire class

Materials: overhead projector, transparency, with outline of football field (including yard marks, 5 yard intervals), tagboard cut into shape of football, kitchen timer, two construction paper or tagboard cards (one red, one green), stack of cards with number combinations to be summed

Procedure(s):

- Split class into two groups, line up along walls.
- One group has red card, and the other green.
- Red begins first half, green second. Place "ball" on 20-yard line toward red's goal.
- Set timer for six minutes (or any other number).
- Read number combinations (i.e., three plus four).
- Student who has red card must respond quickly and accurately (2-3 seconds). Pass card to the next player in line when he/she answers correctly or incorrectly.
- Advance the "ball" toward red's goal if correct and no penalty (see below).
- When ball crosses goal, six points are scored for their team. Keep score on board or overhead.
- Penalties:
  - "Delay of game" — ball moves 5 yards backward. Call next pair of numbers for same student.
  - "Fumble" — wrong answer given. Ball goes over to other team at the place it was fumbled.
  - "Interference" — talking out of turn — 15 yards in favor of non-offending team.

Suggested Monitoring Procedures

Pair students having difficulty with specific combinations with more able student for review and drill.

Possible Resources

District adopted text.

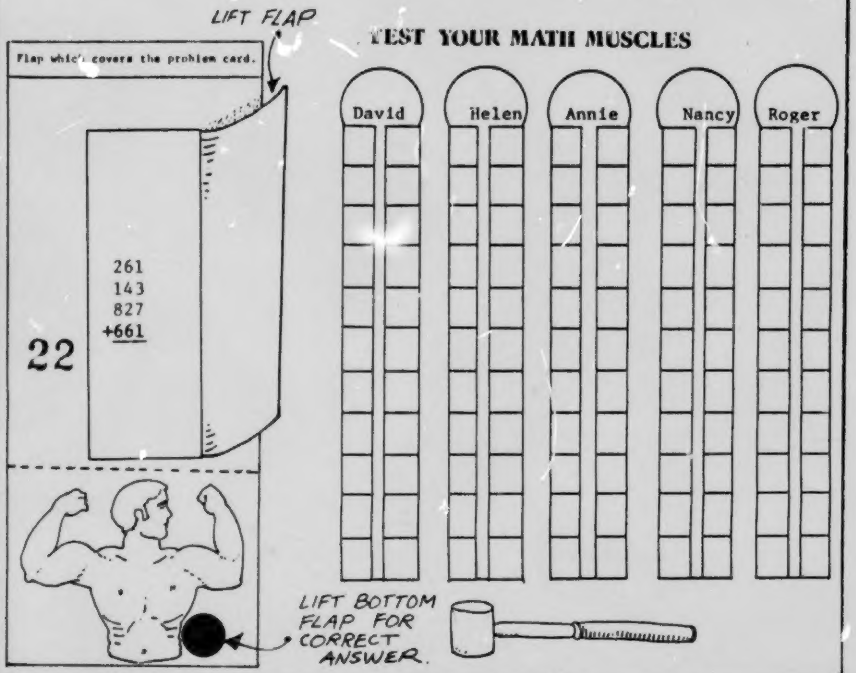
District Resources

Suggested Activities: Grade(s) ______

Title: Test Your Math Muscles
Group Size: small groups
Materials: game board, markers, worksheet, paper, pencils

Procedure(s):

- One of the players sits out the competition, others playing.
- This player chooses the problem to be worked and inserts it under the problem holder.
- The problem is concealed from the others until the selector says go.
- The others solve the problem. They may or may not copy the problem.
- As they finish they lay down their pencil and place their writing hand on the top of their head.
- The player who is sitting out checks the answer.
- The first person who finishes correctly advances one space toward ringing the bell.


LIFT FLAP
Flap which covers the problem card.
261
143
827
+661
LIFT BOTTOM FLAP FOR CORRECT ANSWER.
TEST YOUR MATH MUSCLES
David
Helen
Annie
Nancy
Roger

Suggested Monitoring Procedures

Possible Resources

District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows and maintains skills and basic facts of addition taught in primary grades (see Mathematics, Addition K-3). B. The student is able to complete any addition problems in either horizontal or vertical form. C. The student values the quick and accurate recall of basic facts.

Related Area(s)

State Goal	1,8
District Goal	
Program Goal	2,3,5

Suggested Activities: Grade(s) 7-8

Title: Six Digit Relay
Group Size: teams of six
Materials: cards with 6 digits in each number for addends, chalk, chalkboard

Procedure(s):

- The first person on the team writes the problem on the chalkboard then adds the one place digit and records the answer carrying any number necessary to the tens column.
- The second student adds the tens column and records it, carrying if necessary.
- The game proceeds until the problem is solved.
- The first team with the correct answer wins.

Title: Addition Tic-Tac-Toe
Group Size: pairs
Materials: large cardboard, tic-tac-toe board, two boxes of cards (marked: x - problems on back of card, 0 - problems on back of card)

Procedure(s):

- Two students play Tic-Tac-Toe by choosing "X" or "0," picking cards from appropriate boxes and working exercises.
- If answer is correct (the other student checks), the student places his/her card on a square.
- If not, student must wait until next turn.

Suggested Monitoring Procedures

Worksheet of basic addition facts. Group students who have problems with certain combinations and reteach.

Possible Resources

District adopted text.

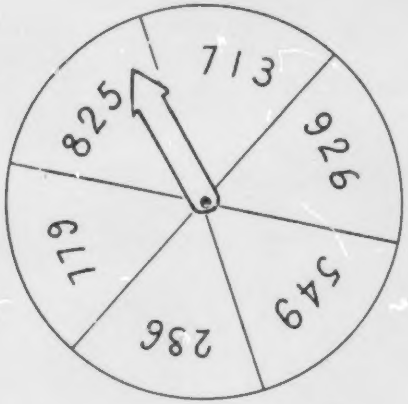
District Resources

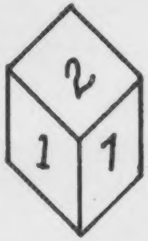
Suggested Activities: Grade(s) ______

Title: Spin Addend
Group Size: pairs, small group
Materials: 1 die marked 2-7, spinner cards (see illustration), spinner, paper and pencil

Procedure(s):

- Players, in turn, roll the die to see how many addends they must spin.
- The spinner is spun the number of times the die indicates, and the players write down the addends.
- The resulting problem is then solved.
- Players check each other's work.
- One point if correct; thirteen wins.





Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows and maintains skills and basic facts of addition taught in primary grades (see Mathematics, Addition K-3). B. The student is able to estimate sums using the concepts of "greater than" or "less than" (140 + 90 > 200 or < 250).

State Goal	1,8
District Goal	
Program Goal	2,3,5

Related Area(s) ______

Suggested Activities: Grade(s) 7-8

Title: Estimating Sums
Group Size: small group
Materials: chalkboard, worksheet

Procedure(s):

- Ask the group if there are situations in life when it might be important to estimate an answer in adding. Help students to elicit responses such as shopping, telling time, estimating distance, mileage, etc.
- Put several examples on the board, and have students work the problems as a group using the terms "greater than" and "less than."
- Give students additional examples on a worksheet. Have the students circle their estimated answer, then work the problem as a check.

Example(s):

4821 + 190 > 5000 or < 5100
284 + 990 > 1100 or < 1300

Suggested Monitoring Procedures

Worksheet of addition problems to check combinations that pose problems. Group students for reteaching.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ____	Suggested Monitoring Procedures	Possible Resources
		District Resources

JECT: Mathematics

SPECIFIC AREA: Whole Numbers: Subtraction

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. that subtraction is the inverse of addition.		1-3					
. that subtracting zero from a number does not affect the sum.		1					
. the difference is the result of subtracting one quantity from another, i.e., 5 - 3 = ②		1-2					
. the minuend is the quantity from which another quantity is to be subtracted, i.e., ⑥ - 3 = 3.		1-2					
. the subtrahend is the quantity to be subtracted from another, i.e., 4 - ① = 3.		1-2					
. the subtraction facts with a minuend of five or less (mastery).		1-2					
. the subtraction facts with a minuend of nine or less (mastery).		2					
*. the subtraction facts with a minuend of 18 or less (mastery).		2-3					
. and maintains skills and basic facts of subtraction in primary grades (see Mathematics, Subtraction K-3).	11	4-8					
The student is able to:							
. subtract a one-digit number from a one- or two-digit number without remaining (borrowing), i.e., 8 - 2 = 6, 25 - 2 = 23.		1-2					
*. subtract a two-digit number from a two-digit number without renaming (borrowing), i.e., 48 - 26 = 22.		1-2					
. subtract a one-digit number from a two-digit number requiring renaming (borrowing), i.e., 17 - 8 = 9.		2-3					
*. subtract a two-digit number from a two-digit number requiring renaming (borrowing), i.e., 37 - 28 = 9.		3					
. subtract a one-, two- or three-digit number from a three-digit number requiring renaming (borrowing), i.e., 463 - 7 = 456; 463 - 27 = 436; and 463 - 187 = 276.		3					
*. complete any subtraction problem in either horizontal or vertical form.	11	4-6					
. check subtraction problems by addition.	11	4-6					
The student values:							
. the quick and accurate recall of basic subtraction facts.	11	4-6					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______________

SMALL SCHOOL PROJECT - Working Copy

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows and maintains skills and basic facts of subtraction in primary grades (see Mathematics, Subtraction K-3). B. The student is able to complete any subtraction problem in either horizontal or vertical form. C. The student is able to check subtraction problems by addition. D. The student values the quick and accurate recall of basic subtraction facts.

Related Area(s) ____________________

State Goal	1
District Goal	
Program Goal	1,2, 5,6

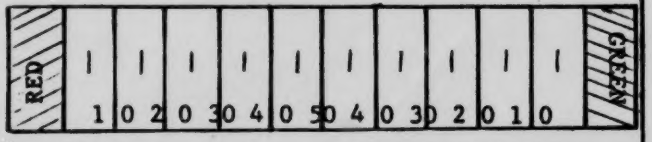
Suggested Activities: Grade(s) 7-8

Title: Football
Group Size: entire class (2 teams)
Materials: overhead projector, transparency with outline of football field (including yard marks, 5-yard intervals), tagboard cut into shape of football; kitchen timer, two construction paper or tagboard cards (one red, one green), stack of cards with number combinations to be subtracted.

Procedure(s):

- Draw outline of football field on transparency.

Example:



- Divide class into two groups, and have students line up along wall.
- One group has the red card and the other the green card.
- The red team begins one first half, the green team one second. Place "ball" on 50-yard line toward red's goal.
- Set timer for six minutes (or any other number).
- Read number combination, i.e., seven minus four.
- Student who has red card must respond quickly and accurately (2-3 seconds).
- Advance the "ball" five yards toward red's goal if correct and no penalties.

Suggested Monitoring Procedures

Give students a worksheet with incomplete subtraction problems and addition problems using like combinations. Circle the errors and reteach students with common combination difficulty.

Possible Resources

District adopted text.

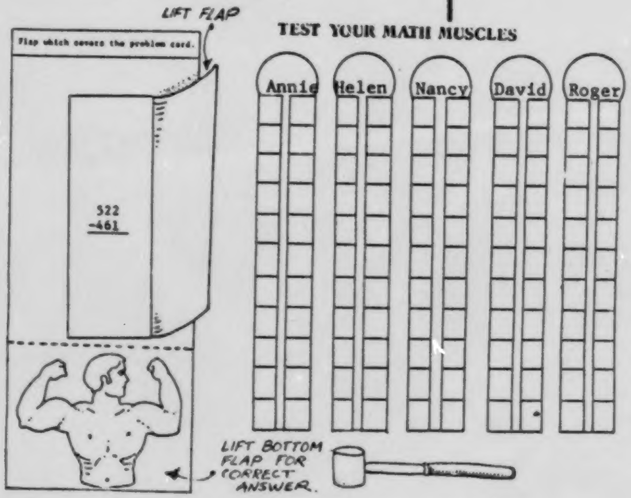
District Resources

- Penalties:
  1. "Delay of game" -- ball moves 5 yards backward.
  2. Call next pair of numbers for same student.
  2. "Fumble" -- wrong answer given. Ball goes over to other team at the place it was fumbled.
  3. "Interference" -- talking out of turn--15 yards in favor of non-offending team.
- Student passes the card to the next student in line if he/she answers correctly. If student answers incorrectly, the ball goes to the other team and is placed on their corresponding yard line.
- When ball crosses goal, 6 points are scored for that team. Keep score on chalkboard or overhead.

Title:	Test Your Math Muscles
Group Size:	small groups
Materials:	gameboard, markers, worksheet, paper, pencil

Procedure(s):
- One student in the small group does not compete with the others. Instead, he/she chooses the problem to be worked and inserts the card with that problem written on it under the problem holder (see illustration). The answer is written at the bottom of the problem card so that it is visible when the flap with the Muscle Man picture is lifted.
- The problem is concealed from the others until the selector says go.
- The other students solve the problem. They may or may not copy the problem.
- As the students finish, they put their pencils down and place their writing hand on top of their heads. The player who is the selector checks the answers. The first player to finish correctly advances one space toward ringing the bell.

Worksheet with subtraction problems. Ask students to check by using addition. Re-group students having difficulty.


LIFT FLAP
Flap which covers the problem card.
522
-461
TEST YOUR MATH MUSCLES
Annie
Helen
Nancy
David
Roger
LIFT BOTTOM FLAP FOR CORRECT ANSWER.

SMALL SCHOOLS PROJECT - Working Copy

[illegible]JECT: Mathematics

SPECIFIC AREA: Whole Numbers: Multiplication

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. that multiplication can be pictured as the combination of equal sets.		3					
. a factor is one of two or more quantities having a designated product.		3					
. a product results when two numbers are multiplied.		3					
. the product of any number multiplied by the factor of zero is zero (6 x 0 = 0).		3					
. the product of any number multiplied by the factor of one is that number (3 x 1 = 3).		3					
*. the multiplication facts with products through 81 (mastery).		3-5					
The student is able to:							
*. multiply one, two and three-digit numbers by a one-digit number: 4 x 5 = 20 $\begin{array}{r}22\\ \times\ 5\\ \hline 110\end{array}$ $\begin{array}{r}222\\ \times\ 5\\ \hline 1110\end{array}$		3-5					
. multiply any number by a two-digit number: $\begin{array}{r}126\\ \times\ 15\\ \hline 630\\ 126\ \\ \hline 1890\end{array}$ $\begin{array}{r}14\\ \times 12\\ \hline 28\\ 14\ \\ \hline 168\end{array}$		4-5					
*. multiply any number by any three-digit number: $\begin{array}{r}626\\ \times 120\\ \hline 12520\\ 626\ \ \\ \hline 75120\end{array}$		5-6					
. estimate products using concepts of "greater than" and "less than."		4-6					
*. multiply by products of 10 (10's, 100's, 1,000's.)		4-6					
The student values:							
. the quick and accurate recall of facts.	15	3-8					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______________

Suggested Objective Placement 3-8

Student Learning Objective(s) The student values the quick and accurate recall of facts.

State Goal	1
District Goal	
Program Goal	5, 8

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources

Title: Basic Facts Solitaire

Group Size: individuals

Materials: deck of cards consisting of multiplication facts

Procedure(s):

- Each deck consists of matching pairs of phrase and answer cards. For example, 7 x 8 and 56 make a multiplication fact pair. The difficulty of the game depends on (1) the difficulty of the facts and (2) the number of pairs of phrase and answer cards in the deck. This may vary from ten to 25 pairs.
- Phrase cards are printed in red and answer cards are printed in black.
- A matching pair consists of a phrase card (red), and answer card (black).
- Player shuffles cards and turns the first two cards face up. If these cards are a matching pair, player then covers them by placing the next two cards face up on top of the first two cards.
- If no pair is showing, the player turns up two more cards so that he/she has four face-up cards showing. Once again. he/she examines them for matching pairs, covering any pairs that are showing as before.
- The play continues with the player turning up two cards at a time whenever no more pairs are showing on the cards that were already turned up.
- When all cards have been played, the player picks up stacks of cards by pairs: she/he picks up each pair of stacks whose top cards form a matching

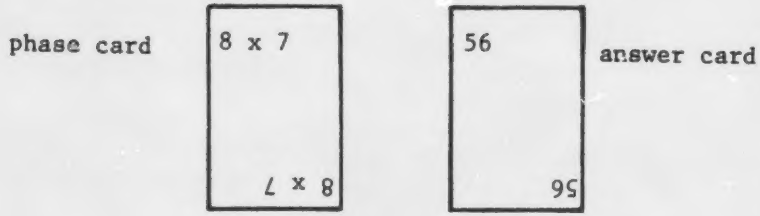
District Resources

pair. If player has not made a mistake, he/she will be able to pick up all of the cards in this manner.

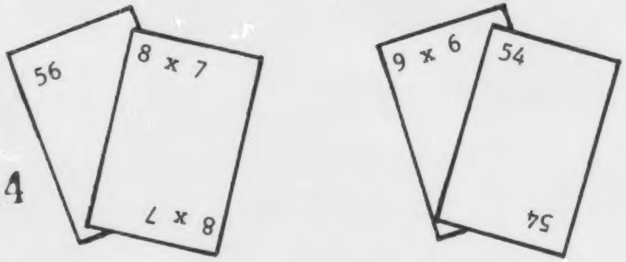
Note:

. The player who recognizes all of the matching pairs as they are turned up will generally need to make fewer stacks of cards than a player who overlooks some of the matching pairs. Two or more players
. may have a contest to see who needs the fewest stacks to complete the game.

Example:



matching pair



Suggested Monitoring Procedures

Possible Resources

District Resources

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Suggested Objective Placement 3-8

Student Learning Objective(s) The student values the quick and accurate recall of facts.

Related Area(s)

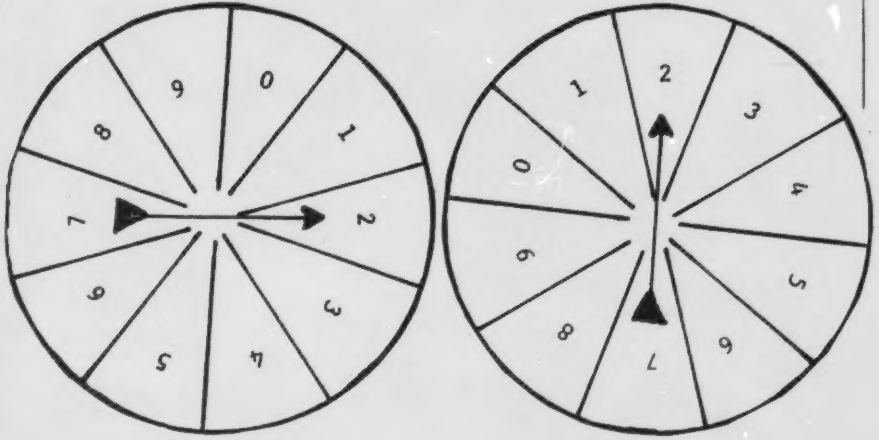
State Goal	1
District Goal	
Program Goal	5, 8

Suggested Activities: Grade(s) 7-8

Title: Spin-a-Fact
Group Size: pairs, small groups
Materials: one gameboard and two markers per student, two spinners per group

Procedure(s):

- The students spin, in turn, both spinners and multiply the two indicated numbers.
- The student then finds the product on the point award chart (found on back of page) to learn points earned.
- The students keep track of score on tally sheet.
- The winner is the first student to earn 100 points. Example of spinners: (Game needs two spinners).



Suggested Monitoring Procedures

Timed fact test.

Possible Resources

Math Laboratory at the Pacific Science Center, Seattle, Washington

District Resources

Suggested Activities: Grade(s) 7-8

Suggested Monitoring Procedures

Possible Resources

SPIN-A-FACT / MULTIPLICATION

Point Award Chart

You get this number of points	1	5	7	20	10
for					
these products	0	6, 8, 12, 18, 24	4, 9, 16, 36	1, 25 49,64 81	2, 3, 5, 7, 10, 14, 15, 20, 21, 17, 28, 30, 32, 35, 40, 42, 45, 48, 54, 56, 63, 72

District Resources

SMALL SCHO[illegible]S PROJECT - Working Copy

Suggested Objective Placement 3-8

Student Learning Objective(s) The student values the quick and accurate recall of facts.

State Goal	1
District Goal	
Program Goal	5, 8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Multo
Group Size: small group, entire class
Materials: card for each player, markers, master card for teacher (with all possible combinations). Note: 1" graph paper works well for the cards.

Procedure(s):

- Pass out cards to each student and enough markers to play a game.
- The rules are those of Bingo. The student card has five rows of five squares. The center square is a free square. Each square has the product of two numbers.

Example: 42, product of 6 x 7

- The tables are divided up with the 0's and 1's under M, 2's and 3's under U, 4's and 5's under L, 6's and 7's under T, and 8's and 9's under O.
- The teacher calls out, "Under L, 6x7," and so on.

M	U	L	T	O
1	6	20	42	64
8	9	10	36	81
0	3	Free	49	32
7	4	15	18	9
6	16	12	14	18

Suggested Monitoring Procedures

Note the consistent winners. Award prizes to winners.

Possible Resources

District Resources

Suggested Activities: Grade(s) 7-8

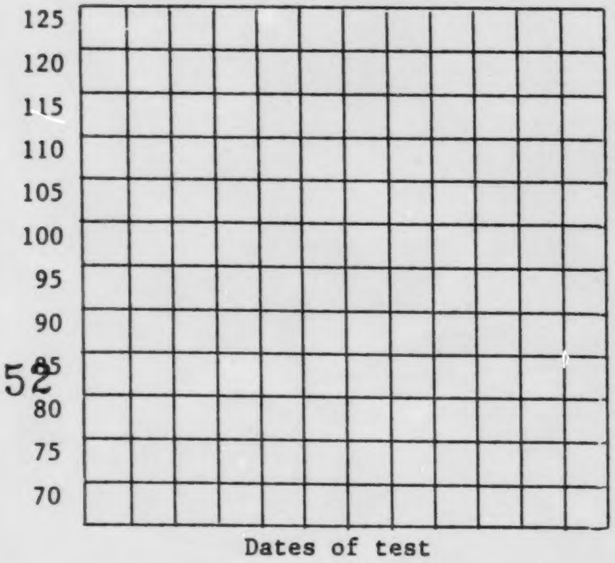
Title: Speed Test
Group Size: entire class
Materials: worksheet of 125 problems

Procedure(s):

- Each student receives a sheet with the fact problems.
- The class is started together and timed for a three minute test. Set a goal to be reached (90 to 100).
- The student plots his/her progress from test to test on a graph kept at her/his desk. This activity continues daily or at least often to increase skill and speed.
- When the goal is achieved regularly by a student he/she may sit out the activity.

Example of problems: 10 12 45 36 94
x11 x23 x13 x45 x48

Graph:



Suggested Monitoring Procedures

Check individual papers, record progress.

Possible Resources

District Resources

SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Mathematics

SPECIFIC AREA: Whole Numbers: Division

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. that division is the inverse of multiplication.		3-4					
. division is repeated subtraction.		3-4					
. a dividend is a quantity to be divided.		4					
. a divisor is the quantity by which the dividend is to be divided.		4					
. the quotient is the quantity resulting from division of one quantity by another.		4					
. the remainder is the dividend minus the product of the divisor and the quotient.		4-5					
* . the basic division facts (mastery).	23	3-5					
The student is able to:							
. divide a one- or two-digit number by a one-digit number without remainders. $\begin{array}{r} 3 \\ 2\overline{)6} \end{array}$	23	3-4					
. divide a one or two-digit number by a one-digit number with remainder expressed as whole numbers. $\begin{array}{r} 2\text{ R1} \\ 2\overline{)5\phantom{\text{ R1}}} \end{array}$		4-5					
* . divide two, three and four-digit numbers by one or two-digit numbers with remainders expressed as whole numbers.		5-6					
* . divide two, three and four-digit numbers by one or two-digit numbers with remainders expressed as a fraction. $\begin{array}{r} 23\ 5/8 \\ 18\overline{)419} \end{array}$		5-6					
. divide five digits or less by two or three-digit numbers with or without remainders (expressed in whole numbers, fractions or decimals). $\begin{array}{r} 49.2 \\ 5\overline{)246} \end{array}$		6-8					
* . solve any given division problem.	25	7-8					
. check a division problem by using multiplication.	27	4-6					
. estimate the quotient in a given division problem.	27	4-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows the basic division facts (mastery). B. The student is able to divide a one or two-digit number by a one-digit number without remainders.

State Goal	1
District Goal	
Program Goal	4,5

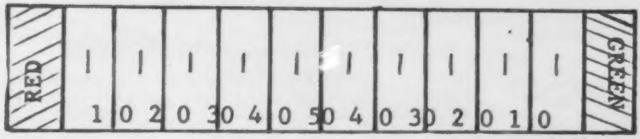
Related Area(s)

Suggested Activities: Grade(s) 7

Title: Football

Group Size: entire class

Materials: overhead projector, transparency with outline of football field, including yard markers, 5 yard intervals, tagboard cut into shape of football, kitchen timer, two, construction paper or tagboard, cards (one red, one green), stack of cards with number combinations to be divided



Procedure(s):
- Split class into two groups, line up along walls.
- One group has red cards and other, green.
- Red begins first half, green second. Place "ball" on 20-yard line, toward goal.
- Set timer for six minutes, or any other number.
- Read number combination (i.e., 12 divided by 4).
- Student who has red card must respond quickly (two or three seconds) and accurately. Pass card to next in line when he/she answers correctly or incorrectly.
- Advance the "ball" toward red's goal if correct and no penalties (see below).
- When ball crossed goal, six points are scored for that team. Keep score on board or overhead.
- Penalties:
  "Delay of game" — ball moves 5 yards backwards.

Suggested Monitoring Procedures

Observation of activity.

Give the students a worksheet with division facts. Correct the worksheet to note division facts that present the most problems. Pair students having difficulty with more able students for additional drill.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7

Call next pair of numbers for the same student. "Fumble" — wrong answer given. Ball goes over to other team at the place it was fumbled.

"Interference" — talking out of turn — 15 yards in favor of non-offending team.

Title: Find the Rule
Group Size: entire class or small group
Materials: worksheet

Procedure(s):

- Have a student give you a number between 1 and 10. Apply a rule such as n x 6 or n ÷ 2 and give the students the result. Do this several times until the students guess the rule you are applying.
- Give the students a worksheet with tables with a sample of numbers only and the rule missing. Have the students complete the tables and fill in the rule.

Example:

n	
42	7
18	3
12	
	4
36	
	10
72	
	1

Answer: n x 6

n	
72	8
	1
108	
	15
36	
18	

Answer: n ÷ 9

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Suggested Monitoring Procedures

Possible Resources

District Resources

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SMALL SCHO PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) The student is able to solve any given division problem.

State Goal	1
District Goal	
Program Goal	2,5,6

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
Title: Division Challenge **Group Size:** small group, entire class **Materials:** chalkboard and chalk **Procedure(s):** . Prepare a variety of division problems with answers, i.e., multiple digit problems with and without remainders. . Pick a student to begin and have him call or someone to challenge him/her. . Teacher gives a problem, first one finished with the correct answer wins and continues to challenge. . Three challenges without a loss retires the champ until later. . When all students have had a chance (give losers another chance against each other), have the champions go against each other until a final winner is found.	Students with little success can be given supplemental activities after the game is completed.	District adopted text.
		District Resources
Title: Secret Code **Group Size:** entire class **Materials:** paper, pencil **Procedure(s):** . Teacher makes up a division problem that corresponds with each letter of the alphabet. . The students have to solve all the problems and match their answers (letter of the alphabet) to the coded message. The coded message could be a sentence or a long paragraph depending on the ability of the group.	As students are working, the teacher can pass among students, helping when necessary.	District adopted text.

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources

Example:
Students are to do the problems below to get the circled answers:

On paper:
A. 42 x 3 = 126
B. 81 ÷ 3 = 27
C. 14 + 18 = 32
D. 1,000,000 - 1,000,000 = 0
E. 3 x 15 - 45
'
'
'
'
'
O. 3 x 1 - 3
'
'
Y. 5 x 50 = 225
Z. 512 ÷ 2 = 256

- The message could be given after they complete the problems or on the paper with the problems. Example of message:

B A D B O Y
27-126-0; 27-3-225

District Resources

63

64

Suggested Objective Placement

Student Learning Objective(s) A. The student is able to check a division problem by using multiplication. B. The student is able to estimate the quotient in a given division problem.

State Goal: 1

District Goal:

Program Goal: 2,5,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Division Bingo
Group Size: entire class
Materials: simple bingo cards with three rows of four squares (twelve squares in all), 1 inch square graph paper.

Procedure(s):

- Pass out Bingo cards to each student with division problems written in each of the squares.
- Each card has different division problems and in different order.
- The teacher has the master sheet.
- Each student also has blank answer cards. When the teacher gives a division problem that the student has on his/her Bingo card, he/she places answer square over division problem and writes on answer card the division problem as a multiplication problem.
- When a row is all covered he/she is the winner provided that he/she has written his/her division problems as multiplication problems correctly.

Variations:

- Same cards as above but this time teacher calls out multiplication inverse operation and student has to cover appropriate division problem.

Suggested Monitoring Procedures

Pair students having difficulty with division with students who are more able for additional drill.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources
67		68

JECT: Mathematics

SPECIFIC AREA: Whole Numbers: Story Problems

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. characteristics of a number sentence are operational sign(s) and an equal sign.	31	2-8					
. basic facts.	35	3-5					
. that - and + are inverse operations.		3-4					
. that X and ÷ are inverse operations.		4-5					
. that not all information given in a story problem may be relevant to the solution of the problem.	37	2-8					
. clue words (total, sum, more, product, remainder, average, quotient).		3-5					
The student is able to:							
. project a mental image (draw a picture) of the problem from an appropriate story problem.	39	2-8					
. identify relevant information necessary for solution.	37	2-8					
. identify operation to achieve solution (+, -, X, ÷).		4-6					
. estimate size of problem solution (> <).		4-8					
. solve story problems with one operation.	35	2-3					
. solve story problems with multiple operations.		4-8					
. develop (write) a story problem from a given number sentence and solve the problem.	31	4-8					
. translate word sentences into "number" sentences.	33	4-6					
. translate equations to solvable form: $\boxed{10}-3=7$ to $\boxed{10}=7+3$.	33	5-8					
The student values:							
. analysis and solution of story problems as the ultimate goal of mathematics.	35	2-8					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________

Suggested Objective Placement 2-8

Student Learning Objective(s) A. The student knows characteristics of a number sentence are operational signs(s) and an equal sign. B. The student is able to develop (write) a story problem from a given number sentence and solve the problem.

State Goal	1
District Goal	
Program Goal	2,6,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: A Picture is Worth a Thousand Numbers

Group Size: pairs, entire class

Materials: picture(s) from magazine or drawing on board or overhead projector (picture of runners finishing race), number sentence on board or overhead (3 minutes 59.4 seconds - 3 minutes 56.2 seconds = A), pencil and paper for each student

Procedure(s):

- Direct the students to write a story problem related to the picture using the number sentence for the solution.
- Exchange story problems and solve. Read to class.

Variation(s):

- Do not furnish number sentence. Students make up their own.

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

District adopted text

Kit - Base Games Media Research Associates 1976

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCH S PROJECT - Working Copy

Suggested Objective Placement 2-8

Student Learning Objective(s) A. The student knows characteristics of a number sentence are operational sign(s) and an equal sign. B. The student is able to translate word sentences into "number" sentences. C. The student is able to translate equations to solvable form: $\boxed{10}-3 = 7$ $\boxed{10} = 7+ 3$.

State Goal	1
District Goal	
Program Goal	2,6,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Story Problem Competition
Group Size: entire class
Materials:

Procedure(s):

- Divide class into groups or teams of four students each. Each team should be assigned the task of developing one story problem for each of the four operations (+, -, X, ÷). In addition they provide a number sentence and solution for the teacher. Groups then exchange problems only. Have a timed contest for finding a number sentence and a solution.

Title: Number Sentence Completion
Group Size: small group, entire class
Materials: worksheet, chalkboard

Procedure(s):

- Give students several problems verbally and have them suggest number sentences to solve problems.
- Put these on the board and solve.
- Give students a worksheet with similar problems to solve.

Example:

Study each word sentence, then write a number sentence and solve.

Six less than a number when the number is sixty-four	64-6 =
Six more than a number when the number is eighty-one	6+81 =
Four times a number when the number is one hundred four	104x4 =
Five minus a number when the number is two hundred eighty three	283-5 =

Suggested Monitoring Procedures

Give students a worksheet with word sentences and have them translate to number sentences with correct operational signs.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
Three more than twice a number when the number is twelve 2x12+3 = Six less than three times a number when the number is sixty-four 3x64-6 =		
		District Resources

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Suggested Objective Placement 2-8

Student Learning Objective(s) A. The student knows basic facts. B. The student is able to solve story problems with one operation. C. The student is able to solve story problems with multiple operations. D. The student values analysis and solution of story problems as the ultimate goal of mathematics.

State Goal	1
District Goal	
Program Goal	3,6,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Shopping Spree
Group Size: individual, entire class
Materials: newspaper, pencil and paper, calculator (optional)

Procedure(s):

- Teacher sets a maximum amount to be spent on shopping spree ($10 or $20, or other reasonable maximum).
- Using the supermarket advertisements, students "shop" at one market only, selecting food items from each of the basic food groups (dairy, meat, cereal grains, fruit and vegetables).
- Students record item(s) selected and price.
- Students total purchases, and must return some items if they exceed pre-set amount to be spent.
- Student or teacher checks total on calculator.

Title: Mail Order Math
Group Size: entire class
Materials: catalogues or supplements, facsimiles of order form (see example), calculator (optional)

Procedure(s):

- Have each student select a topic (shop, kitchen, bedroom, clothing, etc.) or draw lots from prepared slips of paper with one topic on each.
- Each student completes order sheet, ordering three or more items (clothing: 1 shirt, 1 pair pants, 1 pair shoes).
- Student totals amount of order.
- Student (or teacher) checks total on calculator.

Suggested Monitoring Procedures

Teacher observation and individual assistance.

Possible Resources

District Resources

Suggested Activities: Grade(s) ______

Variation(s):

- Multiple items (3 sheets @ $2.65, etc.) may be selected to utilize multiplication.
- Include sales tax (calculated or use tax table).
- Include shipping charges or parcel post charges.

Example:

FERNDOC MAIL ORDER, INC.
1234 1st Street.
Ferndoc, Ohio 54321

Ship to: Name______________________________
Address______________________________
City__________State__________Zip__________

Catalogue Number	Description of Item	Number of Items	Cost per Item	Total Cost

Sub Total

Other Options

Sales Tax ________
Shipping Fee ________
GRAND TOTAL ________

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Objective Placement 2-8

Student Learning Objective(s) A. The student knows that not all information given in a story problem may be relevant to the solution of the problem. B. The student is able to identify relevant information necessary for solution.

State Goal	1
District Goal	
Program Goal	6,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Suggested Monitoring Procedures

Possible Resources

Title:	What's Important
Group Size:	small group, entire class
Materials:	set of cards with a story problem on each containing items of irrelevant information (Five boats with seven people went fishing. Three of the boats sank; however, each person caught two fish. How many fish were caught?), a second set of cards with identical details but question requires formerly irrelevant information to solve (How many boats made it back to dock?)

Procedure(s):

- Call on any student to describe the irrelevant information in his/her problem. Others check theirs to see if they hold the card where that information is relevant.
- Students with matching cards get together and solve problems.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 2-8

Student Learning Objective(s) A. The student knows that not all information given in a story problem may be relevant to the solution of the problem. B. The student is able to project a mental image (draw a picture) of the problem from an appropriate story problem.

State Goal	1
District Goal	
Program Goal	1,2,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Math Art
Group Size: individual, entire class
Materials: drawing paper, crayons or colored pencils, paint or chalk, felt pens

Procedure(s):

- Teacher writes a descriptive story problem or problems on the chalkboard.

Example:
Three greebletoffs came tumbling and swinging down the hall. One fell in the laundry chute and didn't get out at all. Who made it where?

- Student uses the art materials to illustrate the problem he/she selects.
- Finished illustrations may then be put up on the bulletin board.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Mathematics

SPECIFIC AREA: Integers

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. the set of integers is the set of whole numbers, their opposites and zero, i.e., ...-2, -1, 0, 1, 2...	43	7-8					
. any integer is either positive, negative or zero.	43	7-8					
The student is able to:							
. order integers. Example: $-3 < 4$, $0 > -5$, $-7 < -3$, $-4 > -8$.	43	7-8					
. find the opposite of an integer. Example: 6 -6, -3 +3.	47	7-8					
. find the position of an integer on the number line.	49	7-8					
. read and write equations with positive and negative integers.	51	7-8					
* . add integers. Example: $(-6) + (-3) = -9$.	53	7-8					
. subtract integers. Example: $(-7)-(-2) = -5$.	53	7-8					
* . multiply integers. Example: $(-2)(-3) = 6$.	57	7-8					
. divide integers. Example: $20 \div (-2) = -10$.	57	7-8					
. solve word problems requiring integers.	63	7-8					
. solve one step ($X+3=2$) and two step ($3X+1=2$) open sentences involving integers.	61	7-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

SMALL SCHO PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the set of integers is the set of whole numbers, their opposites and zero, i.e., ...-2, -1, 0, 1, 2... B. The student knows any integer is either positive, negative or zero. C. The student is able to order integers. Example: $-3 < 4$, $0 > -5$, $-7 < -3$, $-4 > -8$.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,7,8

Suggested Activities: Grade(s) 7

Title: Ordering Integers
Group Size: entire class
Materials: index cards

Procedure(s):

- Divide class into groups of eight to ten.
- Each student is assigned an integer, and assigned to a group.
- Groups can be as simple as a row, or the teacher can select groups of 8 - 10 students.
- Each student writes his/her integer on a card.

Example: $\boxed{3}$ $\boxed{-7}$ $\boxed{0}$

- At a signal from the teacher, the groups arrange themselves in order from smallest to largest.
- The first group to get the correct order wins that round.
- The group to win a number of rounds wins the game.

Title: Line Up!
Group Size: ten plus
Materials: chalk, index cards with different unique integers on them (including 0) and ">" and "<."

Procedure(s):

- Draw a long chalk line on the floor.
- Pass out cards.

Suggested Monitoring Procedures

Observation of activity with assistance given to students who have difficulty with the integers concept.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______

- Student who is 0 takes his/her place on the line.
- Then each student is chosen at random to take a position along the line.
- The distance between students is not critical.
- Establish that the integers are correctly ordered.
- Then give a student the ">" and "<" signs.
- Have two students step out and have student place the correct sign between them.
- Continue until a correct pattern of responses develops.

Title: "Integers"
Group Size: entire class
Materials: worksheets

Procedure(s):

- Students shade boxes where integers are ordered correctly.

$^{-}5=5$	$^{-}3 < {}^{-}2$	$7 > 9$
$^{-}7 > 0$	$0 < 7$	$0 > 1$
$^{-}1 < {}^{-}2$	$5 > {}^{-}6$	$7 > 10$
$2 > 7$	$^{-}2 > 7$	$^{-}12 < {}^{-}20$
$^{-}3 > 2$	$^{-}1 < 0$	$9 < 4$

Suggested Monitoring Procedures

Observation. Test

Possible Resources

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the set of integers is the set of whole numbers, their opposites and zero, i.e., ...-2, -1, 0, 1, 2.... B. The student knows any integer is either positive, negative or zero. C. The student is able to order integers. Example: -3 < 4, 0 > -5, -7 < -3, -4 > -8.

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

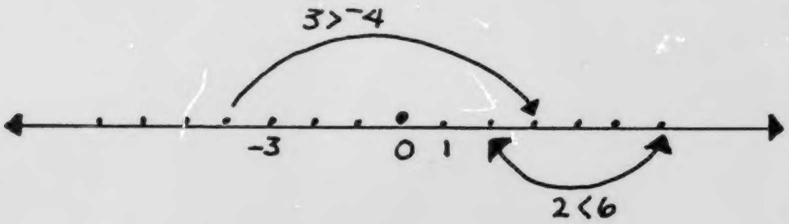
Title: "Comparing Integers"
Group Size: entire class
Materials: 4 incomplete number lines

Procedure(s):

- Copy the number lines and write the integers that are missing.
- Use arrows and labels, as in example, to compare the pairs of integers. Make one comparison below each number line and one above.

Example:

① 0, 5 ② -2, -5 ③ -7, 2 ④ 1, 3 ⑤ 7, 2
⑥ -1, 1 ⑦ -4, 0 ⑧ -7, 7



Suggested Monitoring Procedures

Give the students a worksheet with incomplete number lines and similar problems as a follow-up.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the set of integers is the set of whole numbers, their opposites and zero, i.e., ...-2, -1, 0, 1, 2... B. The student knows any integer is either positive, negative or zero. C. The student is able to find the opposite of an integer. Example: 6 -6, -3 +3.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,7,8

Suggested Activities: Grade(s) 7-8

Title:	Integer Rummy
Group Size:	small group
Materials:	64 cards (30 negative integers, 1-10; 30 positive integers, 1-10; 4 zero cards), score card.

Procedure(s):

- Dealer shuffles cards and gives each player seven cards, remaining cards stacked face down in center of the table. Turn top card face up on the table to form "draw" pile.
- Player on the left of dealer starts play by picking up card that is face up or drawing top card from stack.
- When player has a "run" (at least three consecutive negative or positive integers) he/she puts them on the table and marks 1 point on score card for each card in run. (Three points for a run of three).
- Player can receive double points for run it his/her run cancels one of the other players.

  Example:

  Player A has a run consisting of -3, -4, -5 on the table. Player B gets double or 6 points if he puts down a run of 3, 4, 5.
- Game ends when player has played all his/her cards and has only one card to discard; however, the last card discarded must be a "zero" card.
- Player to go out first receives five points.
- Shuffle cards and repeat, first player with 50 points is the winner.

Suggested Monitoring Procedures

Observation of the activity.

Possible Resources

District adopted text

District Resources

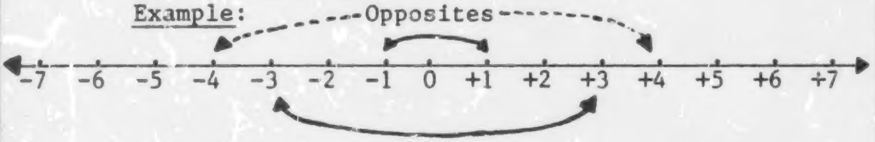
Suggested Activities: Grade(s) 7-8

Title: Integers and Their Opposites
Group Size: entire class
Materials: pencil and paper

Procedure(s):

. Draw a number line from -7 to +7.

Example:



. Label all 15 integers.
. Above zero write the word "Opposites."
. With arrows link three integers with their opposites
. What number must each letter be replaced with to make each sentence true?

. $5 + n = 0$ Answer__________
. $y + {}^{-}3 = 0$ Answer__________
. $-6 + k = 0$ Answer__________
. $4 + {}^{-}4 = m$ Answer__________
. $-1 + X = 0$ Answer__________

Suggested Monitoring Procedures

Have students do a short quiz with a worksheet comparable to the activity.

Possible Resources

District adopted text.

District Resources

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Suggested Objective Placement 7-8

State Goal	1
District Goal	
Program Goal	2,7,8

Student Learning Objective(s) A. The student knows the set of integers is the set of whole numbers their opposites and zero, i.e., ...-2, -1, 0, 1, 2.... B. The student knows any integer is either positive, negative or zero. C. The student is able to find the position of an integer on the number line.

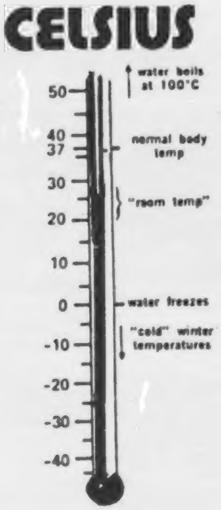
Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Celsius
Group Size: entire class
Materials: worksheet of temperature chart and thermometer

Procedure(s):

- Have students put a mark on Celsius thermometer and label for each day's maximum and mininum temperatures.


CELSIUS
50
40
37
30
20
10
0
-10
-20
-30
-40
water boils at 100°C
normal body temp
"room temp"
water freezes
"cold" winter temperatures

	Max	Min
Sunday	45	+6
Monday	+10	-8
Tuesday	+5	-5
Wednesday	+12	-20
Thursday	+40	+10
Friday	+50	+25
Saturday	+37	+20

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______

Title: Integers on a Number Line
Group Size: three
Materials: number line across entire chalkboard from -15 to +15, 20 shuffled cards marked from -10 to +20.

Procedure(s):

- One student acts as caller.
- The two players start at "0" on the number line.
- The players move in turn on the number line as the caller turns over one integer card at a time and names the integer.
- The object of the activity is to be the first player off the number line or to be nearer one end than the other player after all cards are drawn.

Suggested Monitoring Procedures

Observe the activity, noting students who have difficulty with the concept.

Possible Resources

District adopted text.

District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows any integer is either positive, negative or zero.

B. The student is able to read and write equations with positive and negative integers.

State Goal	1,8
District Goal	
Program Goal	1,2,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Writing Integers and Equations
Group Size: small group, entire class
Materials: worksheet

Procedure(s):

- Express a series of common experiences as an integer.

  Example: (Make equations of 4, 5, 6, 7). Draw a picture to illustrate #2.

  1. The quarterback was sacked for 15. -15
  2. A Chinook raised the thermometer from -5 to +40 in two hours. ($40 - {}^{-}5 = 45$) $+45$
  3. At the track the man lost his "across the board" bet on the 4th race. -6
  4. The most tense time of liftoff is from -1 minute to +1 minute. ($1 - {}^{-}1 = 2$) $+2$
  5. The team gained 150 yards passing but lost 50 yards rushing. ($150 - 50 = 100$) $+100$
  6. The temperature rose 10° from 0°, then fell 4°. ($10 + {}^{-}4 = 6$) $+6$
  7. A householder spent \$15 on groceries in the morning and \$5 more in the afternoon. ($15 + {}^{-}5 = {}^{-}20$) ${}^{-}20$

Suggested Monitoring Procedures

Pair more able students with students having difficulty with integers for additional assistance.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows any integer is either positive, negative or zero. B. The student is able to add integers. Example: (-6) + (-3) = -9. C. The student is able to subtract integers. Example: (-7) - (-2) = 5.

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
Title: Adding and Subtracting Integers with Living Models **Group Size:** entire class or small group **Materials:** chalk or buy an adhesive number line for the floor **Procedure(s):** . Draw a number line on the floor. . Begin by having a student locate an integer on the number line. . Add another integer of the same sign to it by having a student walk off the correct number of units in the correct direction. . Then add integers of different signs by reversing direction of travel. . To illustrate subtraction have two students stand on the integers that are given and find the difference by counting the units they are apart. Does the order of subtraction make a difference?	Observation of the activity.	District adopted text **District Resources**
Title: Integer Relay **Group Size:** entire class (two teams) **Materials:** index cards with positive and negative integers on them. **Procedure(s):** . Form two teams and give each a stack of integer cards. . The first player picks two cards and adds them together on the board. . He/she then tags the next member who picks a card, adds it to the previous sum, etc. . Give the 1st team to finish, 3 points.	Observation of the activity.	

Suggested Activities: Grade(s) 7-8

- Give 5 points for each time a sum was correctly added.
  Variation: The game can also be played by subtracting the smaller number from the larger on the first draw and then subtracting each subsequent number.

Title: Zero Wins
Group Size: pairs, small group
Materials: index cards (with the positive and negative integers up to 50--100 cards--for a large group, up to 25 for a small group--50 cards)

Procedure(s):

- Shuffle cards and deal out all cards.
- Dealer starts by laying down any cards which "cancel out" that is, cards whose total value is zero.
  Example:

$$\boxed{5} \quad \boxed{{}^-5}$$

- The dealer then picks a card from the hand of the player on his/her right whose turn is next.
- Start first by limiting cards to pairs.
- Then require three cards, four cards, etc., in order to "cancel out."
  Example:

$$\boxed{5}\ \boxed{{}^-3}\ \boxed{{}^-2}$$

First player out of cards wins and is new dealer.
Variation: Require all pairs have a difference of a set number such as -5.

Suggested Monitoring Procedures

Observation of the activity.

Possible Resources

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows any integer is either positive, negative or zero. B. The student is able to add integers. Example: (-6) + (-3) = -9. C. The student is able to subtract integers. Example: (-7) - (-2) = 5.

State Goal 1
District Goal
Program Goal 2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
		District adopted text

Title: Magic Squares Involving Integers
Group Size: entire class
Materials: magic squares

Procedure(s):

- Remind students that in a magic square each row, each column, and each diagonal have the same sum.
- Circle the magic squares in the following.

¯3	10	1
7	3	¯1
5	¯5	9

-6	¯7	¯2
¯1	¯5	9
¯8	¯3	-4

11	¯10	5
4	2	8
¯1	14	¯7

¯1	9	¯2
1	2	3
6	¯5	7

- Complete the magic squares below by writing the correct integer in each box.

¯6		¯8
¯7	¯5	
¯2	-9	

	¯8	7
¯2		10
1		¯5

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
121		District Resources 122

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows any integer is either positive, negative or zero. B. The student is able to multiply integers. Example: (-2) (-3) =6. C. The student is able to divide integers. Example: 20 ÷ (-2) = ¯10.

State Goal 1, 10

District Goal

Program Goal 2,3,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Multiplication/Division Bingo

Group Size: entire class

Materials: bingo game board as shown below, marker, multiplication and division problems with positive and negative integers

Procedure(s):

- The caller reads the multiplication and division problems with positive and negative integers.
- For example, one card might read "N — negative 5 times negative 6." Cell N 2 has + 30 or ¯5 • ¯6 on it. A marker is placed on that cell.
- A second card might read "G — negative 12 divided by negative 3." Cell G 5 has + 4 or ¯12 ÷ 3 on it.
- The first player who covers a horizontal, vertical, or diagonal straight line wins.

Sample card:

1	¯4	+1	¯5	+2	+12
2	¯9	0	+30	+22	¯7
3	+8	+19	FREE	¯3	¯16
4	+36	¯10	¯21	¯14	¯1
5	+6	+11	¯25	+4	¯27
	B	I	N	G	O

Suggested Monitoring Procedures

Give students a worksheet with multiplication and division problems involving integers. Correct and group students needing additional assistance.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows any integer is either positive, negative or zero. B. The student is able to multiply integers. Example: (-2) (-3) = 6. C. The student is able to divide integers. Example: 20 ÷ (-2) = (-10).

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Integer Relay
Group Size: entire class
Materials: index cards with positive and negative integers on them

Procedure(s):

- Form two teams and give each team a pile of cards.
- The first player picks two cards and multiplies them on the board.
- He/she then tags the next team member who picks a card, multiplies it to the previous product, etc.
- Give the first team to finish, 3 points.
- Give 5 points for each time a product was correct.

Variation:

- the division process may be used instead of multiplication.
- in division draw 2 cards each time and do not use the previous quotient.

Title: Multiplication Bingo with Integers
Group Size: entire class
Materials: spinner, dice

Procedure(s):

- Each student makes a 5x5 Bingo card on paper.
- In the boxes write any integers from -81 to 81 omitting 0, 1 and all prime numbers.
- The teacher either picks two single-digit integers or uses a spinner or special dice.
- The student multiplies those two numbers together and x's out the answer if it appears on his/her card.

Suggested Monitoring Procedures

Teacher observation. Note students having difficulty, diagnose problem and reteach if necessary.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7-8

- The first to get a "Bingo" wins.

Variation:

- Can use 3 integers.
- Multiply any two of the integers and divide by the remaining integer.

Title: Operations Puzzle
Group Size: entire class
Materials: operations puzzle

Procedure(s):

- Copy and complete the operations puzzle by placing the missing operational signs or integers in the empty boxes.

			-4			
	-24	X		=	96	
	÷		÷		÷	
-3		x	-2	=	6	
	=		=		=	
	8		2	+		16

Suggested Monitoring Procedures

Observation of the activity. Group students having difficulty with the concept for reteaching.

Possible Resources

District adopted text

District Resources

SMALL SCHO PROJECT - Working Copy Suggested Objective Placement 7-8

Student Learning Objective(s) The student is able to solve one step (x + 3 = 2) and two step (3x + 1 = 2) open sentences involving integers.

State Goal	1,8
District Goal	
Program Goal	1,2,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: One-Step Open Sentences
Group Size: entire class
Materials: one-step open sentences

Procedure(s):

- The purpose of this activity is to help students use additive inverses to find equivalent sentences involving integers.
- What is so special about a number and its additive inverse? (Their sum is 0.)
- Examine the open sentence:
  $x + 3 = 8$
  What is the additive inverse of 3? (-3)
  Show what happens when we add -3 to both sides.
  $x + 3 + {}^{-}3 = 8 + {}^{-}3$
  Then $x + 0 = 5$ and $x = 5$
- Are the four sentences above all equivalent (over) sentences?
- Why?
- Can the following open sentences be solved by using additive inverses?
  1. $x + {}^{-}5 = 7$
  2. $y - 7 = 13$
- If your answer is yes, what do we add to both sides?

Suggested Monitoring Procedures

Give students a worksheet with one-step open sentences and ask them to use the additive inverse to work the problems.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) 7-8

Title: Two-Step Open Sentences
Group Size: entire class
Materials: two-step open sentences

Procedure(s):

- The purpose of this activity is to stress that addition is used first to create an equivalent sentence having the variable alone on one side, and then multiplication follows.
- Copy and complete this open sentence using two approaches:

Addition, then multiplication approach

$$
\begin{aligned}
&3x + 2 = 8\\
&3x + 2 + {}^{-}2 = 8 + {}^{-}2\\
&3x + 0 = 6\\
&3x = 6\\
&x = 2
\end{aligned}
$$

Multiplication, then addition approach

$$
\begin{aligned}
&3x + 2 = 8\\
&\frac{1}{3}(3x) + \frac{1}{3}(2) = \frac{1}{3}(8)\\
&x + \frac{2}{3} = \frac{8}{3}\\
&x + \frac{2}{3} + \frac{{}^{-}2}{3} = \frac{8}{3} + \frac{{}^{-}2}{3}\\
&x = \frac{6}{3}\\
&x = 2
\end{aligned}
$$

- Did you discover that performing the addition step first resulted in a simpler method of solving?

Suggested Monitoring Procedures

Observe students during the activity. Group students having difficulty with the concept and reteach.

Possible Resources

District adopted text.

District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) The student is able to solve word problems requiring integers.

State Goal	1,8
District Goal	
Program Goal	1,2,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Problem Solving with Integers
Group Size: pairs, small group
Materials: problem sheets and solution sheet written by each student number cards equal to the number of problem sheets.

Procedure(s):

- Have students make up five word problems on one sheet of paper and their solutions on another sheet.
- Assign each problem sheet a number.
- Have each student draw a number card. If a student draws his/her own set of problems, that student must draw another number card.
- The student must do the five problems on the sheet that was drawn.

Title: Competition for Problem Solvers
Group Size: two small groups
Materials: word problems involving integers 2 answer keys for the word problems

Procedure(s):

- Teacher gives, either orally or in written form, a word problem to the students.
- As soon as a student finishes the problem, he/she folds the paper and passes it forward to the group's checker.
- The checker does not solve any of the problems. The checker corrects the papers for his/her group and returns incorrect papers to the owners for correcting.

Suggested Monitoring Procedures

Teacher observation

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) 7-8

- When all the papers in a group are correct, the checker writes the answer on the chalkboard.
- The first group to do five problems correctly is the winner.

Title: Solving Word Problems Using Number Sentences
Group Size: entire class
Materials: word problems to solve

Procedure(s):

- The purpose of this activity is to give students a method to help solve word problems.
- **Write** a number sentence that illustrates the problem.
- **Solve** the number sentence.
- State the answer.

Example:
The elevator went down 2 floors, up 3, up 5, and down 9. What was the net change?

Number sentence: $^-2 + 3 + 5 \quad ^-9 = n$
Solve: $^-2 + 3 + 5 \quad ^-9 = {}^-3$
Answer: The net change is floors was down 3.

- Two problems to solve:

1. During a 4 week period a stock price went up $6 one week, down $2 the second week, down $7 the third, and up $13 the fourth week. What was the net change?
2. I opened a bank account with a $48 deposit, added another $53, and then withdrew $37. How much have I left?

Suggested Monitoring Procedures

Give student a worksheet with word problems involving the use of integers. Have them solve the problems using the same format as the activity.

Possible Resources

- District adopted text

District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) The student is able to solve one step ($x + 3 = 2$) and two step ($3x + 1 = 2$) open sentences involving integers.

State Goal	1,8
District Goal	
Program Goal	1,2,8

Related Area(s)

Suggested Activities: Grade(s) 8

Title: Integer Eights
Group Size: small group
Materials: deck of 50-60 cards, divided evenly into four suits (colors) and each with different simple equations written on it.

Procedure(s):

- Shuffle and deal seven cards.
- Place remaining deck in center of table with discard pile next to deck.
- Turn over top card to form discard pile.
- First person to the left of dealer either lays down a card of the same color, or a card having the same value for its unknown as the card on the top of the discard pile.
- Second to the left does the same, only using the new top card.
- Play continues around the table, each player playing on the previous players discard.
- If a player can't play, he/she must draw from the deck until he/she can play.
- A card with a value of 8 for its unknows is wild and can be played at any time.
- When an 8 is played, that person can change the suit (color) to better match the rest of his/her hand, or if possible to keep the next person from playing.
- If the deck is exhausted, the discard pile is shuffled and turned over.
- The first person to get rid of his/her cards is the winner.

Suggested Monitoring Procedures

Teacher observation. Test on same equations as on cards.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources
141		142

Suggested Objective Placement 7-8

Student Learning Objective(s) The student is able to solve one step ($x + 3 = 2$) and two step ($3x + 1 = 2$) open sentences involving integers.

State Goal	1,8
District Goal	
Program Goal	1,2,8

Related Area(s)

Suggested Activities: Grade(s) 7

Title: Number Code
Group Size: individual, entire class
Materials: number code sheet, direction sheet

Procedure(s):

. Have students solve two step equations and use answer to answer "number code questions."

Example:

Direction Sheets

Solve the following step equations. Circle the answers in the right spot on the number code sheet and connect each circle with a straight line in order to make a letter. In this case, three letters will make a word.

Letter One:	Letter Two	Letter Three
$\frac{x}{13} + 2 = 3$	$\frac{w}{2} + 3 = 3\frac{1}{2}$	$3a - 4 = 14$
$2x + 3 = 5$	$4w - 3 = 21$	$2a - 14 = 0$
$4x + 2 = 14$	$2w - 18 = 18$	$\frac{a}{3} + 2 = 6$
$\frac{x}{5} - 2 = 1$	$13/w - 1 = 0$	$3a - 26 = 13$
$\frac{x}{3} - 6 = 0$		$\frac{18}{a} + 5 = 6$
$2x - 4 = 8$		

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

District adopted text.

District Resources

NUMBER CODE SHEET -

1	7	13	1	7	13	1	7	13
2	8	14	2	8	14	2	8	14
3	9	15	3	9	15	3	9	15
4	10	16	4	10	16	4	10	16
5	11	17	5	11	17	5	11	17
6	12	18	6	12	18	6	12	18
	1st Letter			2nd Letter			3rd Letter	

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144

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

145

146

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S[illegible]ECT: Mathematics

SPECIFIC AREA: Rational Numbers: Fractions

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. any integer can be expressed as a fraction.	71	5-7					
. a fraction consists of a numerator (which is on top) and a denominator (which is on the bottom) with the line between as a symbol which means divide.	71	5-7					
. proper fractions have numerators which are less than the denominator.	81	5-7					
. improper fractions have numerators greater than or equal to the denominator.	87	5-7					
. mixed numbers (forms) consist of a whole number added to a proper fraction.	83	5-7					
The student is able to:							
. identify and write fractions to represent parts of a region.		4-5					
. write a fraction for part of a set.	75	5-6					
. identify and write fractions to represent an uncompleted division of two numbers.	75	5-7					
find fractions that are equivalent to given fractions.	73	5-7					
. order fractions with like denominators.	79	5-7					
. order fractions with unlike denominators.	87	5-7					
. locate a fractional number on a number line.	89	5-6					
*. change fractions to simplest forms.		5-7					
. change mixed forms to improper fractions.	83	5-7					
*. add and subtract fractions with like denominators.	79	4-7					
*. add and subtract mixed forms with like denominators.	85	5-7					
*. add and subtract fractions with unlike denominators.	87	5-8					
*. add and subtract mixed forms with unlike denominators.	87	6-8					
. express addition and subtraction answers in simplest form.		5-8					
*. multiply fractions (proper and improper) by fractions and/or by whole numbers.	81	5-6					
. express fraction multiplication products in simplest forms.	91	5-8					
*. divide fractions.	93	5-7					
. divide mixed forms.	95	5-7					
. express fraction division quotients in simplest form.	91	5-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______________

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Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows any integer can be expressed as a fraction. B. The student knows a fraction consists of a numerator (which is on top) and a denominator (which is on the bottom) with the line between as a symbol which means divide.

State Goal	1
District Goal	
Program Goal	2,7

Related Area(s) ____

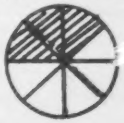
Suggested Activities: Grade(s) 7

Title: Shady Fractions
Group Size: small group, entire class
Materials: worksheet

Procedure(s):

- Use a transparency or the chalkboard to illustrate an integer expressed as a fraction with numerator/denominator (5/6, 1/2, 1/4, etc.).
- Give the students a worksheet with sets with parts of the sets shaded or marked.
- Students are to indicate in a fraction form the part of the set that is shaded or marked.

Example(s): 1.



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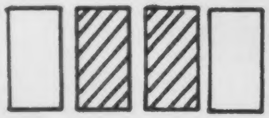
2.



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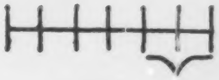
3.



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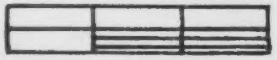
4.



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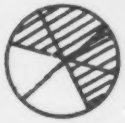
Variation:

- Indicate an incorrect fraction on the line below the sets and ask the students why it is incorrect.

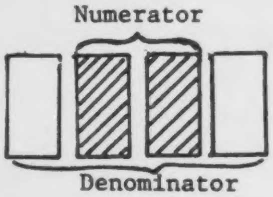
Example:



3/4 Why? ____

Suggested Monitoring Procedures

Have students label the numerator and denominator in the sets on the worksheet, i.e.,



Possible Resources

TR, Topic 55, Representing Common Fractions, Wisconson Research and Development, Center for Cognitive Learning, Rand McNally and Company, 1975

District Resources

Suggested Activities: Grade(s) _______

Title: Bingo
Group Size: entire class
Materials: Bingo cards (6 lines by 6 lines) to be made by students, markers

Procedure(s):

- Teacher puts 25 or more fractions on the board.
- Each student places the fractions on his/her own Bingo form in no particular order (at random).
- Teacher calls out one number to be used as a numerator and one number to be used as a denominator.
- Student having a fraction consisting of those numbers on his/her card, puts a marker on that space.
- Winner is first to "BINGO" in whatever pattern agreed upon or designated at the start of the game.

B	I	N	G	O
1/2	7/1	1/3	4/8	2/4
8/1	6/1	4/6	1/6	3/1
3/4	2/1	4/1	1/8	10/1
1/10	1/7	1/9	5/10	1/5
1/4	3/6	5/1	2/3	9/1

Suggested Monitoring Procedures

Teacher observation of the activity.

Possible Resources

District adopted text.

District Resources

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Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows any integer can be expressed as a fraction.

B. The student is able to find fractions that are equivalent to given fractions.

State Goal	1
District Goal	
Program Goal	3,5,8

Related Area(s)

Suggested Activities: Grade(s) 7

Title: Equivalence Relay
Group Size: entire class
Materials: paper, pencil

Procedure(s):

- The teacher divides the room into teams of any size larger than five.
- The teacher gives to the first member of each team, the same fraction.
- At a given signal, the first person on each team writes down an equivalent fraction on a blank sheet of paper and passes it to the next person on his/her team. That person writes down another equivalent fraction and passes it to the next person.
- The process is repeated until the final team member is finished.
- The first team to have its final member obtain a fraction equivalent to the first fraction wins that round.
- The first team to win a given number of rounds wins the game.

Example:

"A" Team	1st person	1/2 = 2/4
	2nd person	2/4 = 4/8
	3rd person	4/8 = 8/16
	4th person	8/16 = 12/24
	etc.	

Suggested Monitoring Procedures

Observation of activity.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) ______

Title: Fraction Bingo
Group Size: entire class
Materials: Bingo cards from tagboard or 1" graph paper

Procedure(s):

- Have students make Bingo cards by randomly copying fractions from the chalkboard.
- Teacher reads aloud various fractions (reduced, not-reduced, proper, improper) from those listed on the chalkboard.
- Students match the given fraction with those on their card.
- Winner is first to "BINGO" in whatever pattern agreed on or designated at the start.
- Students may exchange cards or make more than one fraction Bingo card.

Example:

B	I	N	G	O
6	1/2	4/5	7/9	3
3/10	8/20	2	6/9	8/12
3/4	5/10	4/12	5	2/3
4	3/8	7/8	2/8	10/30
5/6	3/12	1	8/10	7

Suggested Monitoring Procedures

Note students having problems during game.

Possible Resources

District adopted text

District Resources

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Suggested Objective Placement 5-7

State Goal	1
District Goal	
Program Goal	2,7

Student Learning Objective(s) A. The student knows a fraction consists of a numerator (which is on top) and a denominator (which is on the bottom) with the line between as a symbol which means divide.

B. The student is able to identify and write fractions to represent an uncompleted division of two numbers.

Related Area(s)

Suggested Activities: Grade(s) 7

Title:
Group Size: small group, entire class
Materials: worksheet

Procedure(s):

. Study the example below.
. Fill in the missing information.

Example(s): ●0 = 1 out of 2 = 1/2 = 1÷2 = $2\overline{)1}$

1. ● ● 0 = 2 out of 3 = ___ = 2÷3 = $3\overline{)2}$
2. ● ● ● 0 = ____ = 3/4 = 3÷4 = $4\overline{)3}$
3. ● ● ● 0 0 = ____ = ____ = ____ = ______
4. ● ● ● ● ● 0 = 5 out of 6 = ____ = ____ = ______
5. 0 0 0 0 0 0 0 0 = _____ = _____ = ____ = $8\overline{)3}$
6. One of your own:

__________ = _______ = ____ = ______ = _______

Variation:

. Have students begin with a division problem and reverse the procedure.

Example:

$4\overline{)3}$ = 3÷4 = 3/4 = three of four ● ● ● 0

Suggested Monitoring Procedures

Peruse worksheets. Group students having difficulty with the concept and re-teach.

Possible Resources

Fundamentals of Mathematics, Stein, Edwin I., Allyn and Bacon, Publishers, 1976

Holt School Mathematics, Nichols, et al, Holt, Rinehart & Winston, 1974

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows a fraction consists of a numerator (which is on top) and a denominator (which is on the bottom) with the line between as a symbol which means divide.

B. The student is able to write a fraction for part of a set.

State Goal 1

District Goal

Program Goal 2,7

Related Area(s)

Suggested Activities: Grade(s) 7

Title: Fraction Sets
Group Size: small group, entire class
Materials: large calendar, classroom objects

Procedure(s):

- Display a large calendar and compare a school week with a calendar week. Express this as a fraction and label the fraction, i.e.,

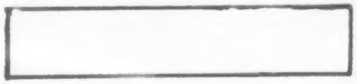
  $\frac{5}{7}$ - school week - Numerator
  calendar week - Denominator

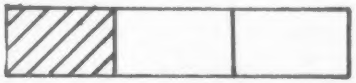
- Repeat this process using other examples from the calendar, i.e., Mondays as compared to all the weeks, all the days in the month, etc..
- Give students a worksheet and ask the following questions to be expressed as a fraction.
  What fraction of the days of the week begins with: W, T, M, S
- Give students a series of fractions on the worksheet such as 1/2, 3/4, 5/6, etc.. Have them circle the fractions that have a numerator of 3; cross out the fractions with a denominator of 6. (Vary with different combinations.)

Title: Fraction the Fractions
Group Size: small group, entire class
Materials: worksheet

Procedure(s):

- Fill in the missing portions of each equivalent.


= 1/2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Suggested Monitoring Procedures

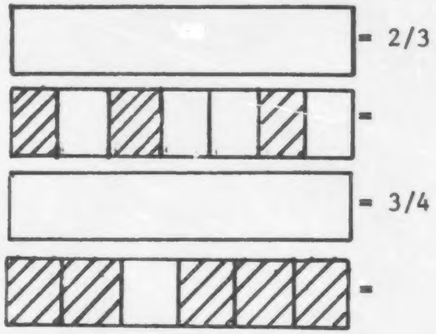
Peruse worksheets.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) _______



Title: Spot the Sets
Group Size: small group, entire class
Materials: worksheet

Procedure(s):

. Make a fraction that compares the shaded circle to the total number of circles in the set, or shade in the set to make it equivalent to the fraction.

Example:

(● 0 0 0) = 1/4

(0 0 0 0) =

(0 0 0 0 0) =

(● 0 0 0 ● 0) =

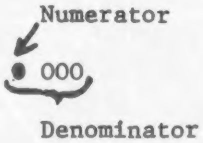
(● ● ● ● ● ●) =

(0 0 0 0 0 0) = 2/6

(0 0 0 0 0 0 0) = 0/7

Suggested Monitoring Procedures

Give students a worksheet with sets similar to the activity and have them work the problems. In addition, have them label the numerator and the denominator in the set, i.e.,



Possible Resources

District Resources

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Suggested Objective Placement 4-7

Student Learning Objective(s) A. The student knows a fraction consists of a numerator (which is on top) and a denominator (which is on the bottom) with the line between as a symbol which means divide. B. The student is able to order fractions with like denominators. C. The student is able to add and subtract fractions with like denominators.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,5,6

Suggested Activities: Grade(s) 7

Title: Adding and Subtracting Fractions
Group Size: entire class
Materials: worksheet

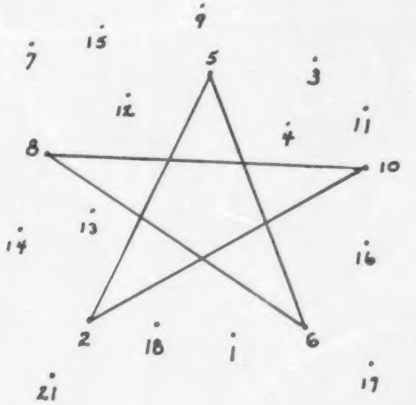
Procedure(s):

. Have students do the problems on the worksheet.
. Have them follow the dots from small to large which correspond to the numbers of correct problems.

Example:

True - False

1. 1/3 + 1/3 = 1/6
✓2. 3/5 + 1/5 = 4/5
3. 2/5 + 1/5 = 3/10
4. 8/9 - 2/9 = 5/9
✓5. 6/7 - 3/7 - 3/7
✓6. 2/9 + 5/9 = 7/9
7. 3/7 + 2/7 = 6/7
✓8. 4/7 + 2/7 = 6/7
9. 8/10 = 6/10 = 2/20
✓10. 10/13 - 8/13 = 2/13



Suggested Monitoring Procedures

Observation of students.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources
108		109

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Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows proper fractions have numerators which are less than the denominator. B. The student knows improper fractions have numerators greater than or equal to the denominator. C. The students is able to multiply fractions (proper and improper) by fractions and/or by whole numbers.

State Goal	1
District Goal	
Program Goal	5,7,8

Related Area(s)

Suggested Activities: Grade(s) 7

Title: Fraction Dots
Group Size: entire class
Materials: worksheet (dot paper) or graph paper

Procedure(s):

- Have students reproduce models of problems on dot or graph paper for multiplication of fractions.
- Later, students can make up and solve their own problems.
- This activity should be done with more difficult fractions as well as improper fractions.

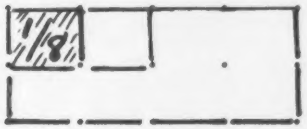
Example:

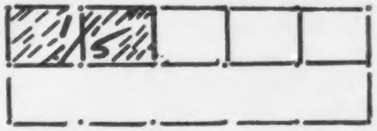
1/2 x 1/4 =

1/2 of 1/4 = 1/8

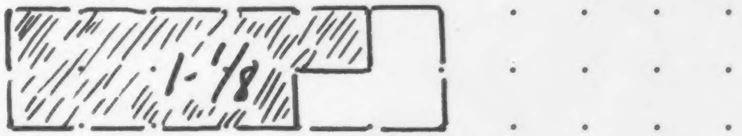
2/5 x 1/2 -

2/5 of 1/2 = 2/10 = 1/5





3/4 x 1-1/2 = 3/4 x 3/2 =
3/4 of 3/2 = 9/8 = 1-1/2



Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows improper fractions have numerators greater than or equal to the denominator. B. The student knows mixed numbers (forms) consist of a whole number added to a proper fraction. C. The student is able to change mixed forms to improper fractions.

State Goal	1
District Goal	
Program Goal	2,5,6

Related Area(s) ____________

Suggested Activities: Grade(s) 7

Title: Improper Fractions--Mixed Numbers

Group Size: entire class

Materials: worksheet

Procedure(s):

. Have students study the examples.

. Have students fill in missing information.

Example(s): Improper --- Mixed Numbers

[★★★★] [★★★★] ★ $\frac{9}{4}$ = 2-1/4 $4\overline{)9}$ → 2-1/4, 8, 1

group into fourths

▲▲▲▲▲▲▲ $\frac{7}{3}$ = ____

group into thirds

○○○○○ ____ = ____

group into thirds

□□□□□□ ____ = ____

group into halves

Mixed Numbers --- Improper fractions

2-3/4 = [★★★★] [★★★★] ★★★ = $\frac{11}{4}$

group into fourths

OR

$2\frac{3}{4} = 4 \times 2 + 3 = \frac{11}{4}$

2-1/3 = ____ = ____

group into thirds, OR

2-1/3 = ____ X ____ + ____ = ☐

Suggested Monitoring Procedures

Peruse completed worksheets--group students having difficulty.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOL PROJECT - Working Copy

Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows mixed numbers (forms) consist of a whole number added to a proper fraction. B. The student is able to add and subtract mixed forms with like denominators.

State Goal	1
District Goal	
Program Goal	2,5

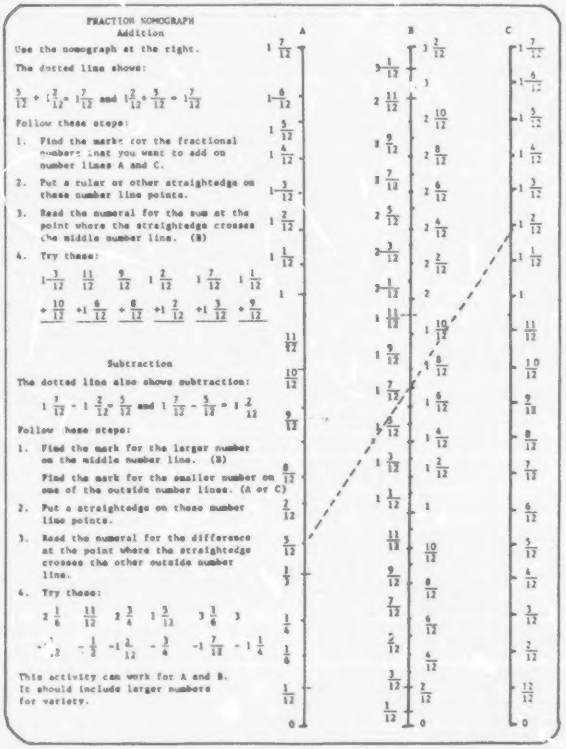
Related Area(s)

Suggested Activities: Grade(s) 7

Title: Adding and Subtracting Like Fractions
Group Size: individual, entire class
Materials: worksheet

Procedure(s):

- Give students worksheet with fraction nomograph.
- Have them follow the directions and answer the problems.
- Similar worksheets can be developed for other denominators.



FRACTION NOMOGRAPH
Addition

Use the nomograph at the right.

The dotted line shows:

$\frac{5}{12} + 1\frac{2}{12} = 1\frac{7}{12}$ and $1\frac{2}{12} + \frac{5}{12} = 1\frac{7}{12}$

Follow these steps:

1. Find the marks for the fractional numbers that you want to add on number lines A and C.
2. Put a ruler or other straightedge on these number line points.
3. Read the numeral for the sum at the point where the straightedge crosses the middle number line. (B)
4. Try these:

$1\frac{3}{12}$ $\frac{11}{12}$ $\frac{9}{12}$ $1\frac{2}{12}$ $1\frac{7}{12}$ $1\frac{1}{12}$
$+\frac{10}{12}$ $+1\frac{6}{12}$ $+\frac{8}{12}$ $+1\frac{2}{12}$ $+1\frac{3}{12}$ $+\frac{9}{12}$

Subtraction

The dotted line also shows subtraction:

$1\frac{7}{12} - 1\frac{2}{12} = \frac{5}{12}$ and $1\frac{7}{12} - \frac{5}{12} = 1\frac{2}{12}$

Follow these steps:

1. Find the mark for the larger number on the middle number line. (B)

   Find the mark for the smaller number on one of the outside number lines. (A or C)
2. Put a straightedge on these number line points.
3. Read the numeral for the difference at the point where the straightedge crosses the other outside number line.
4. Try these:

$2\frac{1}{6}$ $\frac{11}{12}$ $2\frac{3}{4}$ $1\frac{5}{12}$ $3\frac{1}{6}$ 3
[illegible] $-\frac{1}{2}$ $-1\frac{2}{12}$ $-\frac{3}{4}$ $-1\frac{7}{12}$ $-1\frac{1}{4}$

This activity can work for A and B. It should include larger numbers for variety.

Suggested Monitoring Procedures

If some students have difficulty pair them with more capable students and do additional nomographs.

Possible Resources

SEAMATH: Seattle Mathematics Program: K-6, Seattle School District, 815 Fourth North, Seattle, WA, 98109, 1975.

District Resources

BEST COPY AVAILABLE

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student is able to order fractions with unlike denominators.

B. The student is able to add and subtract fractions with unlike denominators.

State Goal	1
District Goal	
Program Goal	4,5,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Ordering Fractions
Group Size: entire class
Materials: worksheet

Procedure(s):

- Students order the fractions from smallest to largest.
- Students then put the corresponding letters in same order on the blanks below to read the message.

NOTE: Individualize by using simple fractions, same numbers, different denominators, for students having difficulty with fractions.

Example:

L = 6/25
C = 1/12
H = 1/10
O = 2/15
S = 1/15
I = 1/4
O = 1/5
S = 3/10
L = 3/4
O = 1/2
O = 2/3
C = 1/3

__ __ __ __ __   __ __

__ __ __ __ !

Suggested Monitoring Procedures

Peruse completed message and problems.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources
184		185

SMALL SCHOOL PROJECT - Working Copy

Suggested Objective Placement 5-6

Student Learning Objective(s) The student is able to locate a fractional number on a number line.

State Goal	1
District Goal	
Program Goal	2,7

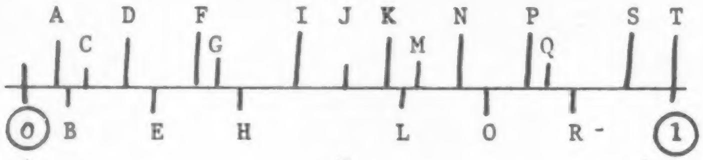
Related Area(s)

Suggested Activities: Grade(s) 7

Title: By the Rule
Group Size: individual, entire class
Materials: worksheet

Procedure(s):

. Have students match the fractions with each point on the number line by filling in the blanks of the corresponding letter.



___A
___B
___C
___D
___E
___F
___G

___H
___I
___J
___K
___L
___M
___N

___O
___P
___Q
___R
___S
___T

1/2, 1/3, 2/3, 1/4, 3/4, 1/5

2/5, 3/5, 4/5, 1/6, 5/6, 1/8

3/8, 5/8, 7/8, 1/10, 3/10, 7/10,

9,10, 1

Suggested Monitoring Procedures

Check and reinforce with similar work on a ruler.

Possible Resources

Fundamentals of Mathematics, Stein, Edwin I., Allyn and Bacon, Publishers, 1976

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources
188		189

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student is able to change fractions to simplest forms. B. The student is able to express fraction multiplication products in simplest forms. C. The student is able to express fraction division quotients in simplest form.

State Goal	1
District Goal	
Program Goal	2,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Dividing for Dollars
Group Size: entire class
Materials: worksheet

Procedure(s):

. Students mark the squares that contain fractions equivalent to 1/2, 2/3, 3/4.

Example:

3/15	7/32	5/7	8/9	2/4	2/5	2/3	8/21	6/15	19/40		
4/12	7/27	6/9	15/20	20/30	18/24	3/6	10/15	22/33			
	8/18	10/15	6/7	6/12	9/11	16/24	9/16	17/33			
9/19	8/18	12/16	17/21	11/22	13/15	24/36	6/15	4/10	4/9		
7/21	9/20	10/20	21/28	60/90	24/32	12/18	4/8	50/100	8/34		
	4/14	3/21	9/16	22/44	12/20	26/39	4/9	27/36		7/21	
4/9	6/32	18/23	7/21	4/8	6/22	14/21	6/14	30/40	6/15		
	5/25	15/30	25/50	44/88	36/48	5/10	33/44	20/40			
	7/10	8/14		8/12	9/16	9/12	7/16	7/15			

Suggested Monitoring Procedures

Give students a worksheet with fractions and have them match equal fractions, i.e.,

c	1/6	a.	1/2
e	6/10	b.	5/6
f	4/6	c.	2/12
a	6/12	d.	4/5
d	12/15	e.	3/5
b	15/18	f.	2/3

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources
192		193

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 5-7

Student Learning Objective(s) The student is able to divide fractions.

State Goal	1,8
District Goal	
Program Goal	5,6

Related Area(s)

Suggested Activities: Grade(s) 7

Title: Dividing Fractions
Group Size: entire class
Materials: paper, pencil, chalkboard

Procedure(s):

- Assign a fraction to each student.
- Call out the names of two students at random.
- Those two people go to the board and divide one fraction by the other (girls fraction by the boys or shorter person by the taller, etc.)
- The first person to get the correct answer gets to choose the next contestants.
- Class also works problems on paper while contestants are at the board.

Example:

1. $3/4 \div 1/2 =$ ____ ($1\frac{1}{2}$)
2. $3/8 \div 1/2 =$ ____ (3/4)
3. $1/2 \div 1/4 =$ ____ (2)
4. $5/6 \div 2/3 =$ ____ ($1\frac{1}{4}$)
5. $4 \div 1/2 =$ ____ (8)

Suggested Monitoring Procedures

Short quiz on division of fractions. Group students having difficulty with the concept for additional help.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources
196		197

Suggested Objective Placement 5-7

Student Learning Objective(s) The student is able to divide mixed forms.

State Goal	1,8
District Goal	
Program Goal	5,6

Related Area(s)

Suggested Activities: Grade(s) 7

Title: Fraction Relay
Group Size: entire class
Materials: paper, pencil

Procedure(s):

- Each row will be a team with the first person in each designated to be the captain.
- The teacher will give five problems, one for the second person, third person, fourth person, etc. in each row.
- The captain does not receive a problem.
- The class works their problems. When they are completed, they pass their answers forward to the captain.
- The captain adds all the answers together and puts his/her answer on the board.
- The first team with the correct answer wins that round.
- The first team to win a designated number of rounds wins the game.

NOTE: The captain should be someone who has already mastered this type of problem being concentrated on that day.

Example:

1. $4 \div 1\frac{1}{2} = 2\frac{2}{3}$
2. $8 \div 1\frac{3}{5} = 5$
3. $14 \div 2\frac{1}{2} = 5\frac{3}{5}$
4. $2\frac{1}{2} \div 8 = \frac{5}{16}$
5. $3\frac{3}{8} \div 9 = \frac{3}{8}$
6. $4\frac{1}{2} \div 5 = \frac{9}{10}$
7. $4\frac{1}{2} \div 2\frac{1}{2} = 1\frac{4}{5}$
8. $7\frac{1}{5} \div \frac{1}{5} = 36$
9. $8\frac{1}{4} \div 2\frac{2}{3} = 3\frac{3}{32}$
10. $6\frac{1}{3} \div 2\frac{1}{2} = 2\frac{8}{15}$

Suggested Monitoring Procedures

Teacher has correct answers to compare to those on the board.

Teacher observes to make sure all students are doing problems.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHO PROJECT - Working Copy

Suggested Objective Placement 5-8

Student Learning Objective(s) The student is able to express fraction division quotients in simplest form.

State Goal	1,8
District Goal	
Program Goal	5,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Ratio Race
Group Size: small groups (up to eight each)
Materials: worksheet

Procedure(s):

- Each player choses a letter from B - I.
- When one player says "GO", both players look for the path of equal ratios from the circled letter at the top to a circle at the bottom.
- The winner is the player who draws his/her path and puts the letter in the circle at the bottom first.
- Path A has been drawn for you. All of the ratios in path A are equal. You can tell that this is so by using the cross products test.

Example:

$\frac{6}{10} = \frac{9}{15}$ is a true proportion since $6 \times 15 = 9 \times 10$.

- Also, the simplest fraction form should be indicated by circling.

(See back of page for worksheet.)

Suggested Monitoring Procedures

Independent project or teacher can check results.

Possible Resources

SEAMATH: Seattle Mathematics Program, Seattle Public Schools
815 Fourth North, Seattle, Wa.
98109, 1975

District Resources

Suggested Activities: Grade(s) _______

A	B	C	D	E	F	G	H	I
$\frac{12}{18}$	$\frac{4}{8}$	$\frac{9}{36}$	$\frac{20}{8}$	$\frac{5}{15}$	$\frac{24}{9}$	$\frac{10}{12}$	$\frac{20}{25}$	$\frac{12}{16}$
$\frac{7}{14}$	$\frac{4}{6}$	$\frac{25}{10}$	$\frac{5}{20}$	$\frac{56}{21}$	$\frac{7}{21}$	$\frac{25}{30}$	$\frac{21}{28}$	$\frac{32}{40}$
$\frac{3}{6}$	$\frac{45}{18}$	$\frac{2}{3}$	$\frac{16}{6}$	$\frac{8}{32}$	$\frac{2}{6}$	$\frac{40}{48}$	$\frac{12}{15}$	$\frac{6}{8}$
$\frac{10}{4}$	$\frac{2}{4}$	$\frac{20}{30}$	$\frac{40}{15}$	$\frac{9}{27}$	$\frac{10}{40}$	$\frac{30}{36}$	$\frac{15}{20}$	$\frac{24}{30}$
$\frac{5}{2}$	$\frac{16}{24}$	$\frac{6}{12}$	$\frac{72}{27}$	$\frac{7}{28}$	$\frac{3}{9}$	$\frac{27}{36}$	$\frac{15}{18}$	$\frac{8}{10}$
$\frac{35}{14}$	$\frac{10}{20}$	$\frac{6}{9}$	$\frac{4}{16}$	$\frac{48}{18}$	$\frac{4}{12}$	$\frac{50}{60}$	$\frac{9}{12}$	$\frac{28}{35}$
$\frac{8}{16}$	$\frac{15}{6}$	$\frac{3}{12}$	$\frac{10}{15}$	$\frac{10}{30}$	$\frac{80}{30}$	$\frac{20}{24}$	$\frac{16}{20}$	$\frac{18}{24}$
$\frac{40}{16}$	$\frac{5}{10}$	$\frac{6}{24}$	$\frac{6}{18}$	$\frac{14}{21}$	$\frac{45}{54}$	$\frac{64}{24}$	$\frac{30}{40}$	$\frac{40}{50}$
$\frac{9}{18}$	$\frac{50}{20}$	$\frac{8}{24}$	$\frac{2}{8}$	$\frac{35}{42}$	$\frac{18}{27}$	$\frac{6}{8}$	$\frac{32}{12}$	$\frac{36}{45}$
					A			

Suggested Monitoring Procedures

Possible Resources

District Resources

SUBJECT: Mathematics

SPECIFIC AREA: Rational Numbers: Ratios, Percentage, Proportion

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. a ratio is a way of comparing two numbers by division, i.e., the ratio of a to b is $\frac{a}{b}$.	101	6-8					
. a ratio can be expressed in the following forms: a to b or $\frac{a}{b}$.	101	6-8					
. a percent is defined as a ratio with denominator of one hundred and is denoted by the symbol %, i.e., 50% is $\frac{50}{100}$.	103	7-8					
. the meaning of the key terms associated with percent: base, rate, and percentage.	105	7-8					
. base x rate = percentage.	105	7-8					
. areas of application for percent: banking, commerce, statistics, communications.	107	7-8					
. a proportion is a statement of equality between two ratios, i.e., $\frac{2}{4} = \frac{6}{12}$.	111	7-8					
. in a proportion the cross-products are equal, i.e., for b and $d \neq 0$, $\frac{a}{b} = \frac{c}{d}$ implies ad=bc.	111	7-8					
The student is able to:							
. rename any rational number as a percent, i.e., .05=5%; .5=50%; $\frac{3}{4}$ = 75%; 2 = 200%; 1½ = 150%.	103	7-8					
* . rename a number in a percent form as either a fraction or decimal i.e., 100% = 1.00; 75% = .75 = $\frac{3}{4} = \frac{75}{100}$ 150% = $\frac{3}{2} = \frac{150}{100}$ = 1½ = 1.5 33 1/3% = $\frac{1}{3}$ = .333...	117	7-8					
* . solve the three types of percentage problems: a% of b = c, i.e., a. given a and b, find c (find 25% of 60).	121	7-8					
b. given b and c, find a (what percent of 90 is 45?)	121	7-8					
c. given a and c, find b (25 is 50% of what number?)	121	7-8					
* . solve for the missing value of a given proportion, i.e., $\frac{8}{X} = \frac{2}{7}$.	115	7-8					
* . solve simple word problems involving percent: interest, commission, compound interest, % of change, discount, price.	107	7-8					

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OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows a ratio is a way of comparing two numbers by division, i.e., the ratio of a to b is $\frac{a}{b}$. B. The student knows a ratio can be expressed in the following forms: a to b or $\frac{a}{b}$.

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources

Title: Ratio Survey
Group Size: entire class
Materials:

Procedure(s):

- Survey the class (either orally or on paper) as to such ratios as:
  - left-handed to right-handed.
  - odd-numbered birthdays to even-numbered birthdays.
  - those having at least one brother/sister to those having none.
  - blonds to brunets.
  - those able to swim for five minutes to those unable to swim.
  - those who have flown (or sailed, or ridden on a train, to those who have not.)
  - those who have broken bones to those who have not.
  - those born in Washington State to those born outside the state.
  - those who walk to school to those who ride the bus.
  - those who have travelled out-of-state to those who have not.
  - those who have been hospitalized (except for birth) to those who have not.
  - those who ride horses to those who do not.
  - foreign car families to domestic car families.
  - those who have visited Canada to those who have not.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows a percent is defined as a ratio with denominator of one hundred and is denoted by the symbol %, i.e., 50% is $\frac{50}{100}$. B. The student is able to rename any rational number as a percent, i.e., .05=5%; .5=50%; $\frac{3}{4}$= 75%; 2=200%; 1½ = 150%.

State Goal 1
District Goal
Program Goal 2,4 7,8

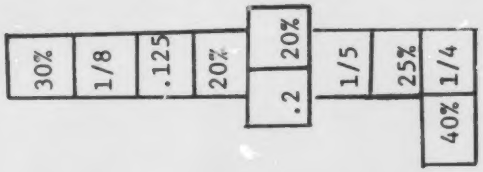
Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Ratio Dominoes
Group Size: pairs
Materials: domino set made from tagboard (or paper pasted on regular domino set)

Procedure(s):
- Cut tagboard into 2.5x5 cm rectangles.
- Write a percent on one end, and on the other end, write a fraction or decimal fraction. Take care that the fraction of one domino will be equivalent to a percent or decimal of another.
- Place dominoes face down on the table. Each
- Each player chooses five dominoes.
- Another domino is placed face up on the table and is the starting domino.
- Player must draw one domino from the unplayed, unchosen dominoes if he/she cannot play from his/her own stack.
- First player to play all his/her dominoes wins.

Example:



Suggested Monitoring Procedures

Give students a worksheet of ratios and have them rename them as a percent, i.e.,

$\frac{2}{5}$ = 40%; $\frac{1}{2}$ = 50%

$\frac{1}{4}$ = 25%; $\frac{3}{4}$ = 75%

Possible Resources

TR
Forbes, Jack, et al. Macmillan Mathematics Skills Practice Book, Macmillan Publishing Co., p. 55.

District Resources

Suggested Activities: Grade(s) 7-8

Title: Percent Concentration
Group Size: pairs
Materials: concentration board, 16 cards with 8 of one color and 8 of another.

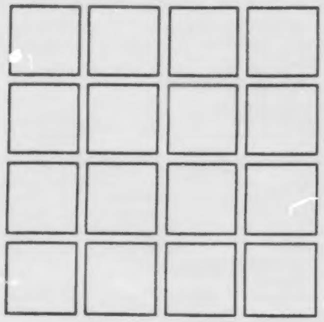
Procedure(s):

- Make up eight cards with rational numbers and eight cards of another color as percentages.
- Place the cards face down on the board. The first player draws a card of each color. If the rational number card and the percentage card match, the player gets one point and draws two more cards.
- If the cards do not match, they are placed face down and the other player gets a turn.
- The winner is the player with the highest total.

Example:

.05	.5	$\frac{3}{4}$	2	$1\frac{1}{2}$	3	.6	.25
5%	50%	75%	200%	150%	300%	60%	25%

CONCENTRATION



Game Board

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the meaning of the key terms associated with percent: base, rate and percentage. B. The student knows base x rate = percentage.

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Base x Rate = Percentage
Group Size: entire class
Materials: worksheet in chart form, overhead or chalkboard.

Procedure(s):

- Review with students that percent means "per hundred." Demonstrate that in order to use percents in computation, it is necessary to change percents to decimals:
  $60\% = \frac{60}{100} = 60 \div 100 = .60$
- Point out that in basic percent problems students can replace percents by decimals in order to multiply:
  20% of $8 = .20 \times 8 = 1.6$
- Use terms for the percent problem as follows:
  20% = .20 is the ratio or rate.
  8 is the base
  1.6 is the percentage of the base. Thus, rate times base equal percentage (r x b = p).
- Go over several examples with students and then have them fill in the chart:
  30% of 50 is ___
  .30 x 50 = p
  .3 x 50 = p
  .3 x 50 = 15

PERCENT PROBLEM	PERCENTAGE	RATE	BASE
8% of 75 is 6	6	.08	75
25% of 56 is ___			
___ is 25% of 56			
80% of 90 is ___			
___ of 50 is 40			

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Suggested Monitoring Procedures

Evaluate the chart.

Possible Resources

District adopted text.

District Resources

218

Suggested Activities: Grade(s)	Suggested Monitoring Procedures	Possible Resources
		District Resources
219		220

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows areas of application for percent: banking, commerce, statistics, communications. B. The student is able to solve simple word problems involving percent: interest, commission, compound interest, % of change, discount, price.

State Goal	1
District Goal	
Program Goal	2,6,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Clearance Sale
Group Size: entire class
Materials: large pictures of items students might like, i.e., ski equipment, stereo equipment.

Procedure(s):
- Attach regular sales prices to each item.
- Teacher puts pictures with prices on the bulletin board along with a sign saying "Clearance Sale -- 20% Off!"
- Give students a fixed amount of money to spend.
- Students are to decide which items they could buy with their money.

Given $150, which of these could you buy?

Item	Regular Price	20% Off
ski boots	$95.00	____
ski jacket	45.00	____
ski mask	12.00	____
ski gloves	8.00	____
stereo	145.00	____
stereo head-phones	35.00	____
speakers	90.00 each	____
turntable	130.00	____

Suggested Monitoring Procedures

Paper and pencil check with similar items.

Possible Resources

District adopted text.
magazines
newspapers

District Resources

Suggested Activities: Grade(s) 7-8

Title:
Group Size: entire class
Materials: copy of your school district's building fund or maintenance and operation budget showing moneys invested on a short term basis.*

Procedure(s):

- Invite the school business manager or superintendent to class to discuss school investments and school finance.
- Class can determine and chart the interest money to be gained.
- Comparison of short term and long term investments could be made.

* Many school districts do invest building funds in short term government bonds or certificates of deposit (CD's).

Title: Compound It
Group Size: entire class
Materials: overhead or chalkboard

Procedure(s):

- Point out to students that interest added to the principal at the end of an interest period is called compound interest. Tell them that most banks automatically deposit the interest in a savings account at the end of the interest period.
- Use the formula i=rxpxn to show how to find interest for a year when r is rate, p is principal, and n is the period of time.

Period	Principal on Deposit	Interest Earned
1	$100	.06 x 100 x 1 = 6.00
2	$100 + $6 = $106.00	.06 x 106 x 1 = 6.36
3	$106 + 6.36=112.36	.06 x 112.32 x 1 = 6.74.

- Give students problems involving bank deposits and have them do compound interest.

Suggested Monitoring Procedures

Have students compare simple interest over a five year period to compound interest using a base of $1000.00.

Possible Resources

District superintendent.

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows areas of application for percent: banking, commerce, statistics, communications. B. The student is able to solve simple word problems involving percent: interest, commission, compound interest, % of change, discount, price.

State Goal	1
District Goal	
Program Goal	

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Real Data in Ratio and Percent

Group Size: entire class

Materials: magazines, newspapers

Procedure(s):

- Have students bring articles from newspapers and magazines that apply to data on ratio or percent.
- Label different parts of the bulletin board "Sports," "Government," "Business," etc., and post articles in appropriate sections.
- Use data from these articles to construct story problems for students to solve.

  Examples:

  "Amount off" in ads that present "n% off regular price."

  Investment loss or gain in stock market changes.

  The percent of total budget (or amount if percent is given) of the nation, state, city, or school district spent for various purposes.

  Win/loss percentage of favorite professional sports team or school team.

Suggested Monitoring Procedures

Teacher observation

Possible Resources

TR

Macmillan Mathematics, Jack E. Forbes et al. Macmillan Publishing Company 1977, p. 279B.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources
227		228

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows a proportion is a statement of equality between two ratios, i.e., $\frac{2}{4} = \frac{6}{12}$. B. The student knows in a proportion the cross-products are equal, i.e., for b and d ≠ 0, $\frac{a}{b} = \frac{c}{d}$ implies $ad=bc$.

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Ratio Rummy
Group Size: small groups
Materials: deck of about 60-80 cards containing integers from 0 to 30 (one per card); skip some prime numbers, i.e., 19, 23, 29; have two or three of some composite numbers, i.e., 4, 5, 6, 8, 12, 16.

Procedure(s):

- Shuffle and deal ten cards.
- Place top card on the discard pile.
- Play starts at the dealer's left.
- First player draws from either pile and must discard.
- The object is to make ratios.
- When a player makes a ratio, i.e., 2/4=3/6 (using four cards 2, 4, 3, 6), he/she lays them down.
- All other ratios player makes must be equal to his/her original one (5/10).
- A player may play on an opponent's ratio, also (the cards are placed in front of his/her own place).
- When the deck is exhausted, shuffle the discard pile and turn it over.
- When a player plays all his/her cards, the round is over.
- Scoring is by face value. Thus, 2/4 = 3/6 = 5/10 would equal 30 points (2+4+3+6+5+10).
- Cards left in a player's hand are subtracted from his/her total.
- The first player to reach a total of 100 points is the winner.

Suggested Monitoring Procedures

Teacher observation of game.
Test.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7-8

Title: Cross-Products Message
Group Size: entire class
Materials: worksheet

Procedure(s):

- Students complete cross products.
- Place letter from correct proportions in order from start to finish. Work down.
- Letters will form a message.

A. $\frac{2}{3} = \frac{6}{9}$
P. $\frac{3}{4} = \frac{6}{8}$
E. $\frac{4}{3} = \frac{5}{4}$
R. $\frac{1}{2} = \frac{6}{12}$
M. $\frac{4}{7} = \frac{5}{8}$
O. $\frac{3}{6} = \frac{13}{24}$
I. $\frac{9}{12} = \frac{15}{20}$
L. $\frac{3}{8} = \frac{15}{40}$

F. $\frac{1}{8} = \frac{3}{24}$
T. $\frac{5}{12} = \frac{2}{3}$
O. $\frac{8}{9} = \frac{24}{27}$
O. $\frac{3}{10} = \frac{18}{60}$
L. $\frac{2}{3} = \frac{8}{12}$
A. $\frac{10}{7} = \frac{30}{22}$
S. $\frac{6}{7} = \frac{24}{28}$
B. $\frac{5}{11} = \frac{6}{12}$

A P R I L   F O O L S

Title: Ratio Race
Group Size: pairs
Materials: see chart below

Procedure(s):

- Each player chooses a letter from B to I.
- When one player says "GO!", both players look for a path of equal ratios from the circled letter at

Suggested Monitoring Procedures

Have students change ratios so that they are a proportion in the examples where there is not equality, i.e.,

E $\frac{4}{3} = \frac{5}{4}$ change to $\frac{4}{3} = \frac{8}{6}$

Have students use cross prod products to check their ratios, i.e.,

$\frac{2}{3} = \frac{4}{6}$ = 3x4, 6x2

Possible Resources

District adopted text.

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows a proportion is a statement of equality between two ratios, i.e., $\frac{2}{4} = \frac{6}{12}$. B. The student knows in a proportion the cross-products are equal, i.e., for b and d $\neq$ 0, $\frac{a}{b} = \frac{c}{d}$ implies ad=bc.

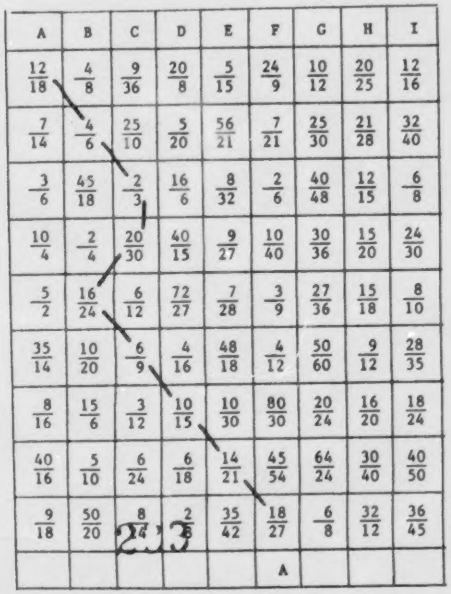
State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s) Rational Numbers: Fractions, decimals.

Suggested Activities: Grade(s) 7-8

the top to a circle at the bottom.
- the winner is the player who draws his/her path and puts the letter at the bottom first.
- PATH A has been drawn. All of the ratios in Path A are equal. You can tell that this is so by using the cross-products test.

Variation: Have some of the ratios replaced with decimals or percentages.



A	B	C	D	E	F	G	H	I
$\frac{12}{18}$	$\frac{4}{8}$	$\frac{9}{36}$	$\frac{20}{8}$	$\frac{5}{15}$	$\frac{24}{9}$	$\frac{10}{12}$	$\frac{20}{25}$	$\frac{12}{16}$
$\frac{7}{14}$	$\frac{4}{6}$	$\frac{25}{10}$	$\frac{5}{20}$	$\frac{56}{21}$	$\frac{7}{21}$	$\frac{25}{30}$	$\frac{21}{28}$	$\frac{32}{40}$
$\frac{3}{6}$	$\frac{45}{18}$	$\frac{2}{3}$	$\frac{16}{6}$	$\frac{8}{32}$	$\frac{2}{6}$	$\frac{40}{48}$	$\frac{12}{15}$	$\frac{6}{8}$
$\frac{10}{4}$	$\frac{2}{4}$	$\frac{20}{30}$	$\frac{40}{15}$	$\frac{9}{27}$	$\frac{10}{40}$	$\frac{30}{36}$	$\frac{15}{20}$	$\frac{24}{30}$
$\frac{5}{2}$	$\frac{16}{24}$	$\frac{6}{12}$	$\frac{72}{27}$	$\frac{7}{28}$	$\frac{3}{9}$	$\frac{27}{36}$	$\frac{15}{18}$	$\frac{8}{10}$
$\frac{35}{14}$	$\frac{10}{20}$	$\frac{6}{9}$	$\frac{4}{16}$	$\frac{48}{18}$	$\frac{4}{12}$	$\frac{50}{60}$	$\frac{9}{12}$	$\frac{28}{35}$
$\frac{8}{16}$	$\frac{15}{6}$	$\frac{3}{12}$	$\frac{10}{15}$	$\frac{10}{30}$	$\frac{80}{30}$	$\frac{20}{24}$	$\frac{16}{20}$	$\frac{18}{24}$
$\frac{40}{16}$	$\frac{5}{10}$	$\frac{6}{24}$	$\frac{6}{18}$	$\frac{14}{21}$	$\frac{45}{54}$	$\frac{64}{24}$	$\frac{30}{40}$	$\frac{40}{50}$
$\frac{9}{18}$	$\frac{50}{20}$	$\frac{8}{24}$	$\frac{2}{8}$	$\frac{35}{42}$	$\frac{18}{27}$	$\frac{6}{8}$	$\frac{32}{12}$	$\frac{36}{45}$
					A			

Suggested Monitoring Procedures

Possible Resources

SEAMATH: Seattle Mathematics
Program: K-6, 1975
Seattle Public Schools
815 Fourth North
Seattle, WA 98109

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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SMALL SCHO PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows in a proportion the cross-products are equal, i.e., for b and d $\neq 0$, $\frac{a}{b} = \frac{c}{d}$ implies ad = bc. B. The student is able to solve for the missing value of a given proportion, i.e., $\frac{8}{X} = \frac{2}{7}$.

State Goal	1
District Goal	
Program Goal	2,6,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

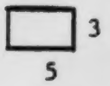
Title:

Group Size: small group

Materials: overhead projector, several rectangles and a square cut from construction paper, chalk, pencil, paper.

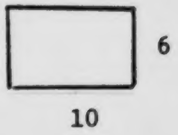
Procedure(s):

- Place rectangle on overhead, projecting onto chalkboard.
- Outline figure on board.
- Measure length and width with meter stick. Write as fraction.



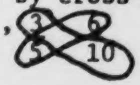
3/5 is the ratio of length to width.

- Move projector back a few inches. Retrace and remeasure.



6/10 is the ratio of length to width.

- Show by cross-product that 3/5 = 6/10

i.e.,


5 x 6 = 30

3 x 10 = 30

Suggested Monitoring Procedures

Give students a worksheet with cross-products to follow the activity:

$\frac{3}{4}$ $\frac{5}{7}$, $\frac{3}{4}$ $\frac{6}{8}$, $\frac{4}{12}$ $\frac{1}{3}$, $\frac{3}{12}$ $\frac{1}{4}$

Possible Resources

District Resources

Suggested Activities: Grade(s) 7-8

Title: Secret Star
Group Size: individual
Materials: 3 x 5 cards

Procedure(s):

. Prepare decoder card:

A =1
B =2
C =3
D =4
E =5
F =6
G =8
H =9
I =10
J =12
K =15
L =16
M =18
N =20
O =24
P =25
Q =27
R =28
S =30
T =32
U =35
V =36
W =40
X =42
Y =45
Z =48

. Other cards contain spaces for letters to be taken from decoder and series of equivalent ratios with one missing number. When determined, this missing number will correspond with the correct letter to be filled into the blanks in order:

_T_ (32) _H_ (9) _E_ (5)
_F_ (6) _O_ (24) _N_ (20) _Z_ (48)

$\frac{3}{8} = \frac{12}{x}$ $\frac{1}{x} = \frac{7}{63}$ $\frac{3}{15} = \frac{1}{x}$

$\frac{3}{x} = \frac{5}{10}$ $\frac{3}{8} = \frac{9}{x}$ $\frac{12}{x} = \frac{6}{10}$

. Determine the missing numbers and discover the star.

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to rename a number in percent form as either a fraction or decimal, i.e., 100% = 1.00; $75\% \doteq .75 = \frac{3}{4} = \frac{75}{100}$; $150\% = \frac{3}{2} = \frac{150}{100} = 1\frac{1}{2} = 1.5$; $33\ 1/3\% = \frac{1}{3} = .333$.

State Goal	1
District Goal	
Program Goal	2, 6, 7, 8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Matching
Group Size: entire class
Materials: worksheets

Procedure(s):

. Students match equivalent forms and find the hidden message.

1. 50% = ______ E = 2/3
2. 67% = ______ P = .5
3. 75% = ______ L = 7/8
4. 150% = ______ R = 2.000
5. 175% = ______ M = .42
6. 38% = ______ C = $1\frac{1}{2}$
7. 33% = ______ I = 3/11
8. 80% = ______ N = .375
9. 30% = ______ S = 4/5
10. 200% = ______ R = 3/4
11. 25% = ______ A = 3/10
12. 22% = ______ T = .333
13. 27% = ______ E = 1 3/4
14. 42% = ______ S = 2/9
15. 40% = ______ E = 1/4
16. 88% = ______ P = .400
17. 83% = ______ E = 5/6

Title: Matching II
Group Size: entire class
Materials: one index card for each student. (One half the cards should contain a percent, the

Suggested Monitoring Procedures

Observation of the activities. Give students a worksheet on which they must rename a number as a fraction and a decimal.

	Fraction	Decimal
60%	$\frac{60}{100}$, $\frac{3}{5}$	.60
75%	______	______
33 1/3%	______	______

Observation of the activities. Give students a worksheet on which they must rename a number as a fraction and a decimal.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources
		District Resources
213		214

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to rename a number in percent form as either a fraction or decimal, i.e., 100% = 1.00; 75% = .75 = $\frac{3}{4}$ = $\frac{75}{100}$; 150% = $\frac{3}{2}$ = $1\frac{1}{2}$ = 1.5; 33 1.3% = $\frac{1}{3}$ = .333.

State Goal	1
District Goal	
Program Goal	2, 6 7, 8

Related Area(s)

Suggested Activities: Grade(s) 7-8

other half should contain an equivalent fraction or decimal.)

Procedure(s):

. At a signal, the students wander around the room trying to find the student whose card matches

. When students find their match, they sit down next to each other.

. Award 10 points for first,
9 points for second,
8 points for third.

Variation: Use Concentration game.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to solve the three types of percentage problems: a% of b = c, i.e., a. given a and b, find c (find 25% of 60). b. given b and c, find a (what percent of 90 is 45?). c. given a and c, find b (25 is 50% of what number?).

State Goal	1
District Goal	
Program Goal	2, 6, 7, 8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Three Kinds of Percent
Group Size: entire class, small group
Materials: overhead, chalkboard

Procedure(s):

- Write the following on the chalkboard or overhead:
  10% of 60 is 6
  10% of 60 is a
  b% of 60 is 6
  10% of c is 6
- Point out that in each case a different number is being found. These are the three basic types of percent problems.
- In three separate lessons, work on the types of percent problems using as many real life problems as possible, i.e., percent of interest, taxes, baseball averages, etc.

Examples of the three types of problems:

5% of 120 = a .05% of 120 = a .05% x 120 = 6	b% of 300 = 60 (think, 60 is what % of 300) $\frac{b\%}{100} = \frac{60}{300}$ 300 b% = 6000 b= 20%	50% of c = 74 .50 c = 74 $\frac{.50}{.50} c = \frac{74}{.50}$ $c = \frac{}{.50}$ c = 148

Suggested Monitoring Procedures

Give students as many real life examples as possible.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7-8

Title: Hidden Message
Group Size: entire class
Materials: worksheet with percentage problems; worksheet with answers keyed to alphabet.

Procedure(s):

- Students work the percentage problems, find the letter of the alphabet that corresponds to their answer, and write each letter as they complete the problems. The letters combine to form a Hidden Message.

B	A	N	K	E	R	S		K	N	O	W
1	2	3	4	5	6	7		8	9		

P	E	R	C	E	N	T
12	13	14	15	16	17	18

1. 10% of 60 is 6
2. 15% of 80 is 12
3. 70% of 120 is 84
4. 95% of 40 is 38
5. 60% of 120 is 72
6. 12% of 80 is 9.6
7. 18% of 60 is 10.8
8. 38% of 100 is 38
9. 20% of 84 is 16.8
10. 25% of 20 is 5
11. 35% of 80 is 28
12. 75% of 150 is 112.5
13. 72% of 200 is 144
14. 10% of 9.6 is .96
15. 83% of 40 is 33.20
16. 20% of 72 is 14.40
17. 84% of 300 is 25.20
18. 16% of 46 is 7.36

Answer Key:
B = 6
K = 38
N = 84
S = 10.8
E = 72
R = 9.6
T = 7.36
C = 83
O = 25
W = 80
P = 150
A = 12

Suggested Monitoring Procedures

Read students' hidden message.

Possible Resources

District adopted text.

District Resources

SMALL SCHOOLS PROJECT - Working Copy

BJECT: Mathematics

SPECIFIC AREA: Rational Numbers: Decimals

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
The student is able to:							
*. read and write decimals to the thousandths.	125	6-8					
*. read and write decimals to hundred thousandths.	129	7-8					
. express a decimal in expanded form to thousandths, i.e., $.438 = \frac{\_\_}{10} + \frac{3}{100} + \frac{8}{1000}$	125	6					
. express a decimal in expanded form to hundred thousandths.	129	7-8					
. express the expanded form of a fraction in decimal form, i.e., $\frac{\_\_}{10} + \frac{3}{100} + \frac{8}{1000} = .438$	125	6-8					
*. order decimals on number line.	131	6-8					
*. round decimals to hundredths, i.e., .763 → .76	133	6-7					
*. round decimals to tenths, i.e., 284 → .3	133	6-7					
*. round decimals to thousandths.	133	7-8					
. round decimals to ten thousandths.	133	7-8					
*. add and subtract decimals to thousandths.	135	6					
*. add and subtract decimals to hundred thousandths.	135	7-8					
*. multiply and divide decimals to thousandths.	137	7-8					
. multiply and divide decimals to hundred thousandths.	139	7-8					
The student values:							

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OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

SMALL SCHOO PROJECT

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student is able to read and write decimals to the thousandths. B. The student is able to express a decimal in expanded form to thousandths, i.e., $.438 = \frac{4}{10} + \frac{3}{100} + \frac{8}{1000}$. C. The student is able to express the expanded form of a fraction in decimal form, i.e.,

Related Area(s) $\frac{4}{10} + \frac{3}{100} + \frac{8}{1000} = .438$

State Goal	1
District Goal	
Program Goal	1,3

Suggested Activities: Grade(s) 6

Title: Decimal Expando
Group Size: small group, entire class
Materials: cards (3x5 or 3x3)

Procedure(s):

- Have students make a number of cards with basic numerals 1 - 9, a decimal point card, two plus sign cards and an equal sign card. In addition have students make cards with expanded fraction forms of each number, i.e., $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$, $\frac{2}{10}$, $\frac{2}{100}$, $\frac{2}{1000}$, etc.
- Read a number and have students form the number with their cards, i.e.,

$$\boxed{.}\ \boxed{3}\ \boxed{2}\ \boxed{5}$$

- Have students match the decimal number with the expanded form in fractions, i.e.,

$$+ \frac{3}{10} + \frac{2}{100} + \frac{5}{1000}$$

- Variation: Reverse the procedure.

Suggested Monitoring Procedures

Walk among students (class) or observe (small group) to see if they have arranged cards correctly.

Possible Resources

District adopted text.

District Resources

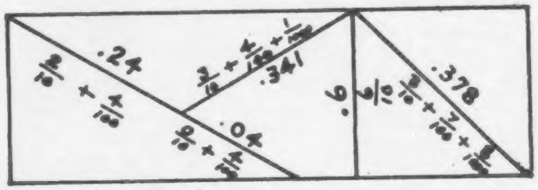
Suggested Activities: Grade(s) 6

Title: Decimal Puzzle
Group Size: pairs
Materials: paper, ruler, scissors

Procedure(s):

- Have each student make a design (see example). Each segment in the design should have a decimal (to the thousandth) on one side and its expanded form on the other side.

  Example:



- Cut apart the design to make a puzzle.
- Have students trade puzzles and try to put them back together by matching the decimal and its expanded form.

Suggested Monitoring Procedures

Give students a worksheet with decimals and have them write the expanded notation, i.e.,

$.6 = \frac{6}{10}$; $.25 = \frac{2}{10} + \frac{5}{100}$;

$.75 = \frac{7}{10} + \frac{50}{100}$; $.251 = \frac{2}{10} + \frac{50}{100} + \frac{1}{1000}$

Possible Resources

District adopted text.

District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student is able to read and write decimals to the thousandths.

B. The student is able to express a decimal in expanded form to thousandths, i.e., $.438 = \frac{3}{10} + \frac{4}{100} + \frac{8}{1000}$. C. The student is able to express the expanded form of a fraction in decimal form, i.e., $\frac{4}{10} + \frac{3}{100} + \frac{8}{1000} = .438$

Related Area(s)

State Goal	1
District Goal	
Program Goal	1,3

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
	Walk among students (class) or observe (small group) to see if they have arranged cards correctly.	District adopted text.

Title: Decimal Expando

Group Size: small group, entire class

Materials: cards (3" x 5" or 3" x 3")

Procedure(s):

- Have students make a number of cards with basic numerals 1 - 9, a decimal point card, two plus sign cards, and an equal sign card.
- In addition, have students make cards with expanded fraction forms of each number, i.e., $\frac{1}{10}, \frac{1}{100}, \frac{1}{1000}, \frac{2}{10}, \frac{2}{100}, \frac{2}{1000}$, etc.
- Read a number and have students form the number with their cards, i.e.,

$$\boxed{.}\quad \boxed{3}\quad \boxed{2}\quad \boxed{5}$$

- Have students match the decimal number with the expanded form in fractions, i.e.,

$$\boxed{=}\ \boxed{\tfrac{3}{10}}\ \boxed{+}\ \boxed{\tfrac{2}{100}}\ \boxed{+}\ \boxed{\tfrac{5}{1000}}$$

Variation:

- Reverse the procedure.

District Resources

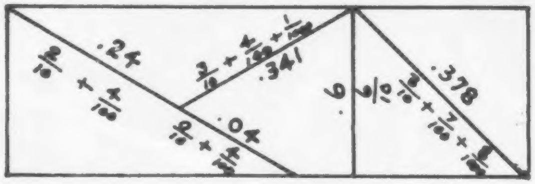
Suggested Activities: Grade(s) _______

Title: Decimal Puzzle
Group Size: pairs
Materials: paper, ruler, scissors

Procedure(s):

- Have each student make a design like this one. Each segment in the design should have a decimal (to the thousandth) on one side and its expanded form on the other side.

Example:



.24
$\frac{2}{10}+\frac{4}{100}$
.341
$\frac{3}{10}+\frac{4}{100}+\frac{1}{1000}$
.04
.9
.378

- Cut apart the design to make a puzzle.
- Have students trade puzzles and try to put them back together by matching the decimal and its expanded form.

Suggested Monitoring Procedures

Give students a worksheet with decimals and have them write the expanded notation, i.e.,

$.6 = \frac{6}{10}$, $.25 = \frac{2}{10} + \frac{5}{100}$

$.75 = \frac{7}{10} + \frac{5}{100}$; $.251 = \frac{2}{10} + \frac{5}{100} + \frac{1}{1000}$

Possible Resources

District adopted text.

District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to read and write decimals to hundred thousandths. B. The student is able to express a decimal in expanded form to hundred thousandths.

State Goal	1
District Goal	
Program Goal	1, 3

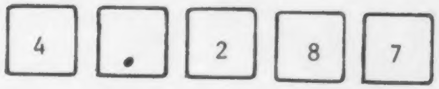
Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Placing the Decimal
Group Size: small group, entire class
Materials: cards (3x5 or 3x3)

Procedure(s):

- Have students make one card for each digit one through nine and one card with a decimal point.
- Read a number containing a decimal and have students arrange their cards to form that number. Note: Read the decimal as "and." Example:

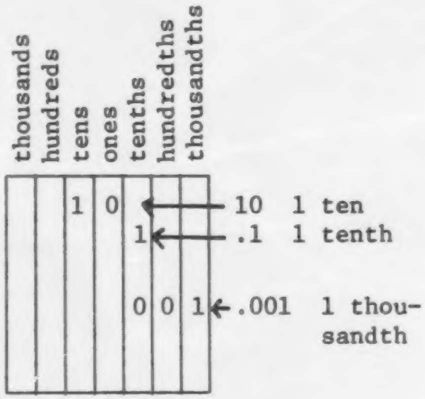


Variation: Arrange cards before the group and call upon students to read the number, or have a student read a number and have other students form the same number with their cards.

Suggested Monitoring Procedures

Walk among students to see if they have arranged the decimal number correctly.

Have students draw place value charts if they have difficulty with this concept, i.e.:



Possible Resources

District adopted text.

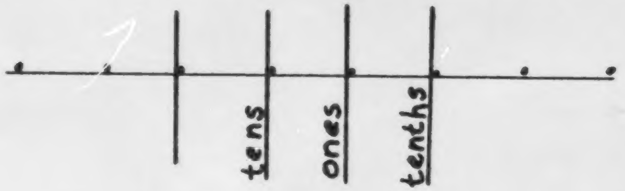
District Resources

Suggested Activities: Grade(s) 7-8

Title: Decimal Place Value
Group Size: small group or entire class
Materials: chalkboard or worksheet

Procedure(s):

- Begin a place value chart on the chalkboard or duplicate one for each student, i.e.,



- Have students extend the chart in both directions (either orally with you at the chalkboard, or on their worksheets).
- Have students write decimals through thousandths by telling them the place value of each digit. For example, 5 in the tenths place, 6 in the hundredths, and 8 in the thousandths place would be 568.

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Suggested Monitoring Procedures

Give students a worksheet of decimal numbers and have them underline the correct numeral as you read them, i.e.,

A. $.5\underline{4}32$ B. $.\underline{5}2$ C. $1.6892\underline{1}$

Underline 4 hundredths in problem A, 5 tenths in problem B, and 1 hundred thousandths in problem C.

Possible Resources

District adopted text.

District Resources

257

SMALL SCHOO PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) The student is able to order decimals on number line.

State Goal	1
District Goal	
Program Goal	3,4,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

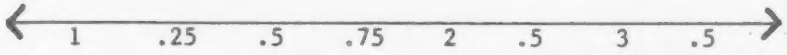
Title: Number Line Code
Group Size: individual, entire class
Materials: worksheets

Procedure(s):

- The teacher makes a worksheet with coded messages for the students to do.

Example:

WORKSHEET________ DATE________ NAME__________



Directions:

- Write in each decimal number on the above number line in its place. Below each decimal number written in, write its corresponding letter to form a message.

3.2 = S
2.01 = L
1.25 = H
2.35 = P
1.33 = E
3.00 = U

Suggested Monitoring Procedures

Give students a worksheet of number lines with some decimal numbers shown, and have them complete the number line.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 6-7

Student Learning Objective(s) A. The student is able to round decimals to hundredths, i.e., .763 — .76. B. The student is able to round decimals to tenths, i.e., .284 — .3. C. The student is able to round decimals to thousandths. D. The student is able to round decimals to ten thousandths.

Related Area(s)

State Goal	
District Goal	
Program Goal	1, 3

Suggested Activities: Grade(s) 7	Suggested Monitoring Procedures	Possible Resources

Title: Unblank the Blank
Group Size: individual, entire class
Materials: worksheet (below)

Procedure(s):

. Round each number below to the nearest hundredth. Find answer in code area. Place letter above problem number.

The purpose of a test is to:

___	___	___	___	___	T	___	___	___	___	___	___	___
4	9	12	3	10	1	6	8	13	7	11	2	5

R	I	D	N	O	A	A	R	N	B	E	I	Y	H	T
7.25	4.68	4.49	7.21	4.67	6.80	3.99	3.61	7.85	4.50	3.76	3.96	7.24	4.66	3.16

1) 3.1587 = 3.16
2) 4.6849
3) 3.9552
4) 4.4928
5) 7.8462
6) 4.66098
7) 7.2537
8) 3.75531
9) 3.6052
10) 7.21498
11) 3.9874
12) 6.79536
13) 4.4982

District Resources

Suggested Activities: Grade(s) 7

Suggested Monitoring Procedures

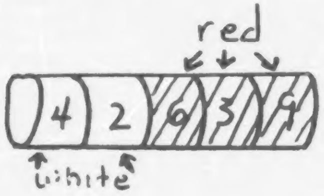
Possible Resources

Title: Rounded Decimals
Group Size: two or more
Materials: center from roll of paper towels, strips of paper (red and white)

Procedure(s):

- Write numerals 0 through 9 or each strip so that they appear as an odometer when wrapped around the tube.
- With red representing decimal fraction places, students round off to nearest tenth or hundredth.

Variation: Use thread spools and a pencil. Partition grid paper and put on the cylindrical surface of each spool. The spools can be rotated to expose the digits as on the face of an odometer. Example:



District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student is able to add and subtract decimals to thousandths.

B. The student is able to add and subtract decimals to hundred thousandths.

State Goal 1

District Goal

Program Goal 5

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Roll and Add or Subtract

Group Size: small groups

Materials: key chart:

Dice		
Red	=	Ones
Blue	=	1/10's
White	=	1/100's
Green	=	1/1000's

pencil, paper, cubes (make each cube a different color to represent each place value. The face of each cube must have a number from 0-9. Each cube will not have every number.)

Procedure(s):

- A student shakes and throws out the dice. Each student writes down the number thrown. After three tosses (numbers), everybody adds.
- After five addition problems have been solved, switch to subtraction. This will require two tosses.
- Students take turns throwing the dice.
  Variation: Teacher may vary the number of place value columns, i.e., whole numbers.
  In addition, the number of tosses may be increased.

Suggested Monitoring Procedures

Students may check each other. Perhaps a group leader could check or the teacher could play.

Possible Resources

District Resources

Suggested Activities: Grade(s) 7-8

Title: Magic Squares
Group Size: entire class or small group
Materials: worksheet

Procedure(s):

- Have students work decimal magic squares.
- Have students add decimals in a vertical, horizontal, and diagonal fashion.

Note: In an addition magic square, the sum of the number in each row, column, and diagonal are the same.

Example:

Add

2.80	.35	2.10
1.05	1.75	2.45
1.40	3.15	.70

.613	.471	.573
.515	.551	.598
.532	.632	.492

Subtract

.160	.130	.220
.190	.250	.310
.280	.370	.340

To subtract: In rows 1, 2, and 3, find the sum of the two end numbers, then subtract the middle number. In columns 1, 2, and 3, follow the same procedure. In diagonals, follow the same procedure.

Suggested Monitoring Procedures

Peruse magic squares. Ask students if they can make magic squares. (Numbers must have a pattern, i.e., all numbers are .10 greater than the previous number.)

Possible Resources

District adopted text.

District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. the student is able to add and subtract decimals to thousandths. B. The student is able to add and subtract decimals to hundred thousandths.

State Goal	1
District Goal	
Program Goal	5

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Decimal Draw
Group Size: small groups (two to six students)
Materials: cards

Procedure(s):

- Make two cards for each of the following numbers: 0, .25, .5, .75., 1, 1.25. 1.5, 1.75, 2, 2.25, 2.5, 2.75, 3, 3.25, 3.5, 3.75, 4, 4.25, 4.5, 4.75, 5.
- Shuffle the cards and put them in a pile.
- The first player draws six cards and tries to make an addition or subtraction equation using three of the cards (if he/she drew the following cards 4, 2.5, 1, .25, .75, 1.5, the player could write 2.5 — 1.5 = 1).
- The player scores one point for a correct equation. If he/she can make more than one equation, additional points can be earned.
- After each player has had a turn, the cards are returned and shuffled and play continues as described above.
- The first player to score ten points wins.

Suggested Monitoring Procedures

Observation of game and correct equations.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to multiply and divide decimals to thousandths. B. The student is able to multiply and divide decimals to hundred thousandths.

State Goal	1
District Goal	
Program Goal	5

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources

Title: Decimal Dice

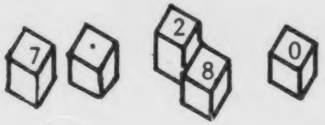
Group Size: small groups

Materials: paper, pencil, five cubes (four have a number from 0-9 on each face and one cube has a decimal point on each face)

Procedure(s):

- To get a good spread of the dice, prepare an area about a foot square for the dice to land in.
- A student shakes and tosses the dice.
- Pull the dice into a line in the approximate order they landed in.

  Example:



7.280

This allows the decimal point to be placed in various positions.

- After each toss, the students write down the number. After two tosses, they multiply and cross-check the answers.

District Resources

Suggested Activities: Grade(s) 7-8

Title: Multiplication Magic Squares
Group Size: small group or entire class
Materials: worksheet, chalkboard

Procedure(s):

- Show students a multiplication magic square. (In a magic square, the product of each row, column and diagonal is the same.)
- Work out the example with the students to show that the example is a magic square.
- Give students a worksheet of several squares and have them work the problems to see which squares are magic.

Example:

A

8.1	.45	5.4
1.8	2.47	4.05
1.35	16.2	.90

B

6.2	4.8	2.1
.6	3.1	2.13
.30	1.9	.08

- A is a magic square as all rows, columns and diagonals equal 19.683. B is not a magic square.

Title: Math Puzzle
Group Size: entire class
Materials: worksheet of puzzle

Procedure(s):

- The puzzle should be solved using the designated numerals, logical thinking, and trial and error to find values for the letters.
- Each letter represents one number less than ten.
- No number is represented by more than one letter, and a letter represents the same number each time it appears.

Suggested Monitoring Procedures

Peruse the worksheets. Have students who grasp the concept easily make up magic multiplication squares.

Worksheets of division and multiplication problems or textbook problems that can be corrected for correct procedure as well as accuracy.

Possible Resources

District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to multiply and divide decimals to thousandths. B. The student is able to multiply and divide decimals to hundred thousandths.

State Goal	1
District Goal	
Program Goal	5

Related Area(s)

Suggested Activities: Grade(s) 7-8

```
              W 4.F
N.W4   /H R. H 8 R
       -W 4  8
          F  F 8
         -4  N 6
             6 W R
            -6 W R
                 R
```

- Solution:

  N= 1, W=2, H=3, F=5, R=0

- For extended activity, have students make up puzzles and exchange.

Suggested Monitoring Procedures

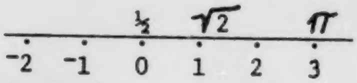
Possible Resources

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SUBJECT: Mathematics

SPECIFIC AREA: Real Numbers

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
• there are rational and irrational numbers. Examples of rational numbers: $\frac{3}{5}$, $\frac{^-2}{3}$, 7, 1.36, .3333 Examples of irrational numbers: π $\sqrt{2}$, .2121121112...	145	7-8					
The student is able to:							
• order real numbers using $< = >$ Example: $\sqrt{2} < 3$ $.6 < .6812$	145	7-8					
• order real numbers on the number line 	147	7-8					
• express common fractions as repeating decimals: $\frac{2}{3} \rightarrow 3\overline{)2.00}^{\,.66} \rightarrow .6.$	153	8					
• express repeating decimals as common fractions. $.150 = \frac{15}{100} = \frac{3}{20}$ $n = .3\overline{3}$ $10n = 3.33$ $^-1n = .3\overline{3}$ $9n = 3.0\overline{0}$ $n = \frac{3}{9} = \frac{1}{3}$ $n = .1\overline{8}$ $100n = .1\overline{8}$ $^-1n = 18.181\overline{8}$ $99n = 18.000\overline{0}$ $n = \frac{18}{99} = \frac{2}{11}$	153	8					
• distinguish between the representations of rational and irrational numbers. Example: rational: 3, $^-6$, .6 irrational: $\sqrt{5} = 2.236068...$ $\sqrt{2} = 1.414214...$	151	8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION 293	ENVIRONMENTAL EDUCATION	OTHER ____________ 294

Suggested Objective Placement 7-8

State Goal	1
District Goal	
Program Goal	2,7,8

Student Learning Objective(s) A. The student knows there are rational and irrational numbers. Examples of rational numbers: $\frac{3}{5}$, $\frac{-2}{3}$, 7, 1.36, .3333. Examples of irrational numbers π $\sqrt{2}$ .2121121112. B. The student is able to order real numbers using $< = >$ Examples: $\sqrt{2} < 3$ $.6 < .6812$

Related Area(s)

Suggested Activities: Grade(s) 7-8

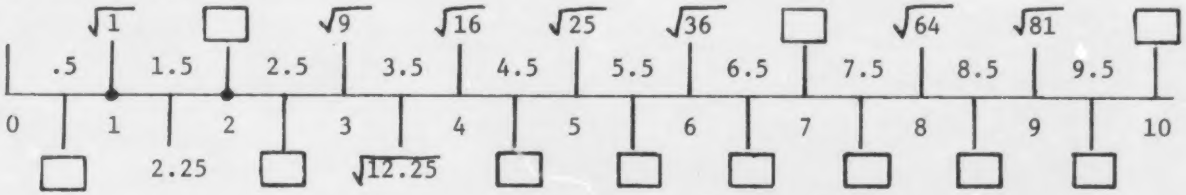
Title: Rationals and Irrationals
Group Size: entire class
Materials: paper, pencil, worksheet with number line from 0-10 (with $\sqrt{\ }$ modifications) See example below

Procedure(s):

- To help students readily identify placement of irrational and rational numbers, have them complete blank spaces on number line.

Example:

- Students are to fill boxes with the correct number on the number line.



Suggested Monitoring Procedures

Teacher observation.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______

Title: Tic Tac Toe
Group Size: pairs
Materials: 3" x 5" index cards with two real numbers to order

Procedure(s):

- Problem cards are placed face down to correspond to the spaces on a Tic Tac Toe game board.
- The players play in turn and choose where they would like to place their "X" or "O."
- Then they attempt to do so by turning over one card at a time, and placing the appropriate sign $>$, =, or $<$ between the two real numbers.
- The player who is first to get three answers correct in a row, column, or diagonal is the winner.

- Sample Tic Tac Toe Game Board:

$\frac{4}{3}$ $\sqrt{2}$	π 3	$\frac{7}{8}$ $\frac{5}{6}$
$\sqrt{3}$ 2	$-\frac{5}{9}$ $-\frac{2}{3}$	$\frac{5}{3}$ $\sqrt{3}$
3 $\sqrt{5}$	$\frac{2}{3}$ $\frac{5}{8}$	$\frac{7}{4}$ $\sqrt{4}$

Suggested Monitoring Procedures

Teacher observation

Possible Resources

District adopted text.

District Resources

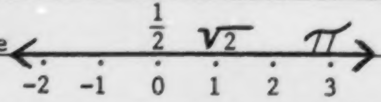
SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 7-8

State Goal	1
District Goal	
Program Goal	2,7,8

Student Learning Objective(s) A. The student knows there are rational and irrational numbers. Examples of rational numbers $\frac{3}{5}$, $\frac{-2}{3}$, 7, 1.36, .3333. Examples of irrational numbers: π 2, .2121121111

B. The student is able to order real numbers on the number line



Related Area(s) ______

Suggested Activities: Grade(s) 7-8

Title: Ordering Real Numbers On the Number Line

Group Size: entire class

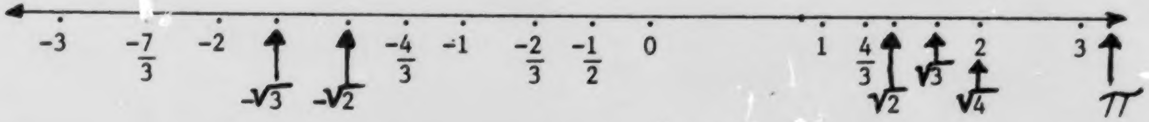
Materials: ruler, pencil, paper

Procedure(s):

- Draw a 10 inch number line.
- Place all the integers from -3 to +3 on your number line so that each integer is 1½ inches apart. The integers are spaced far apart so that the number line does not become distorted as the point for each real number is located.
- In addition to the integers, locate points for the following real numbers symbols:

$-\frac{1}{2}$, $\sqrt{2}$, $\sqrt{4}$, $-\sqrt{2}$, π, $\sqrt{3}$, $\frac{4}{3}$, $\frac{-7}{3}$, $-\sqrt{3}$, $\frac{-2}{3}$, $\frac{-4}{3}$

- List the irrational numbers.
- The number line below has been included for teachers to indicate one way the assignment can be handled so that there is little distortion of the number line.



Suggested Monitoring Procedures

Possible Resources

District Resources

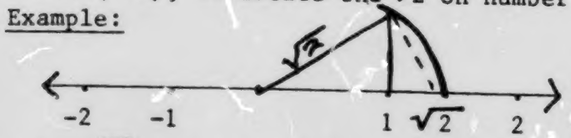
Suggested Activities: Grade(s) 8

Title: Finding $\sqrt{2}$ On a Number Line
Group Size: entire class
Materials: ruler, compass, paper, pencil

Procedure(s):

- Draw a number line approximately four inches long on paper.
- Mark zero approximately in center of line.
- Measure one inch from the right of zero and mark that as 1 on number line. Complete by including the other possible integers.
- Construct a perpendicular line segment to the point at 1.
- Using compass, mark 1 unit vertically above number line on perpendicular.
- By connecting that point with zero, you have a right triangle with legs of 1 unit length, so hypotenuse equals $\sqrt{2}$.
- Using compass, swing an arc equal to length hypotenuse ($\sqrt{2}$), to locate the $\sqrt{2}$ on number line.

Example:



- Can $\sqrt{2}$ be expressed as $\frac{9}{6}$ where a and b are integers, and $b \neq 0$?
- Is 0 a rational or irrational number? Have student state reason.
- Are -2, -1, 1 and 2 both integers and rational numbers?

For Experts only

- Using the Pythagorean Rule, and using the figure above, tell how to find the point on the number line that corresponds to ($\sqrt{3}$).

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows there are rational and irrational numbers. Examples of rational numbers: $\frac{3}{5}$, $\frac{-2}{3}$, 7, 1.36, .3333. Examples of irrational numbers: π $\sqrt{2}$, .2121121112. B. The student is able to order real numbers on the number line:

$$\overset{}{\underset{-2}{\cdot}}\ \underset{-1}{\cdot}\ \underset{0}{\cdot}\ \overset{\frac{1}{2}}{}\ \underset{1}{\cdot}\ \overset{\sqrt{2}}{}\ \underset{2}{\cdot}\ \overset{\pi}{\underset{3}{\cdot}}$$

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Venn Diagram Showing Number Sets

Group Size: entire class

Materials: incomplete Venn Diagram showing the various sets of numbers that have been studied

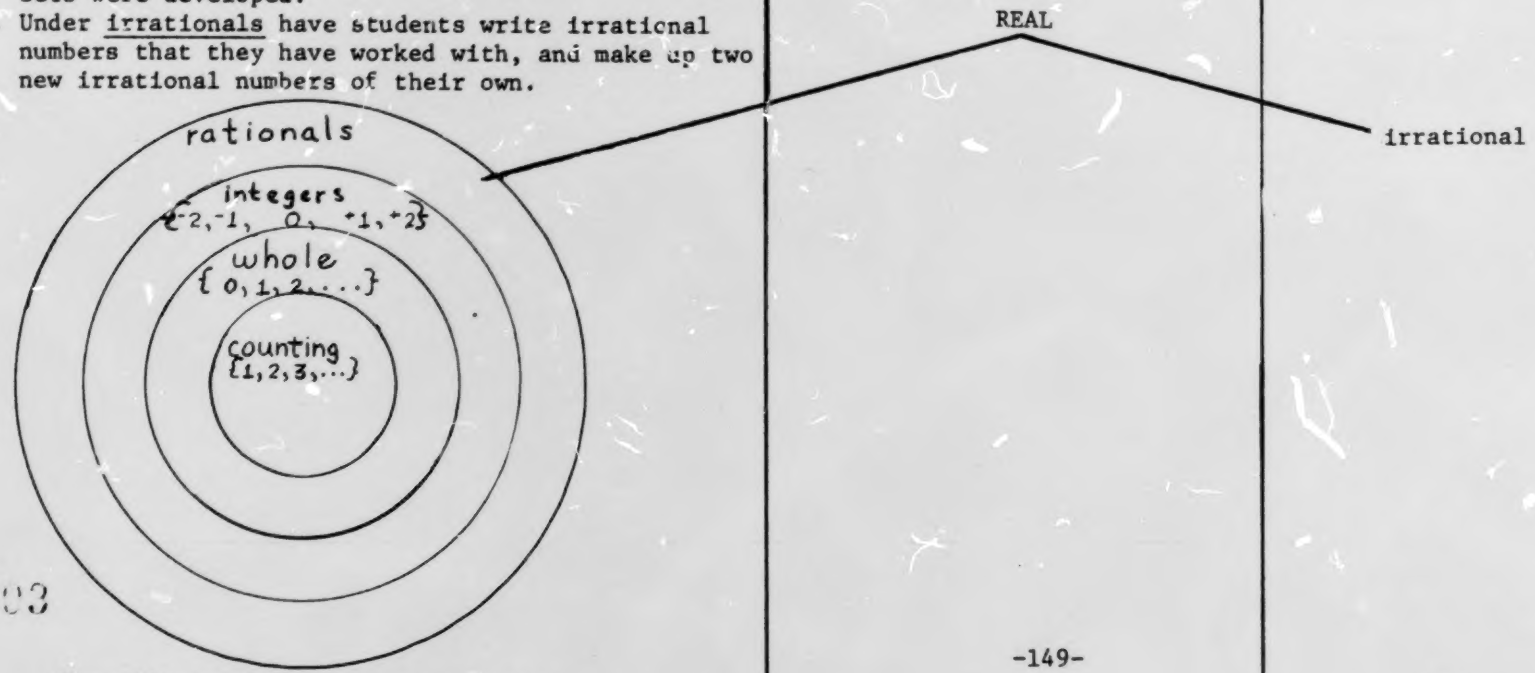
Procedure(s):

- Have students complete the Venn Diagram by illustrating the set of rational numbers much like the other sets were developed.
- Under irrationals have students write irrational numbers that they have worked with, and make up two new irrational numbers of their own.

Suggested Monitoring Procedures

Give students a mixed group of rational and irrational numbers and have them place them under the correct headings in two columns.

Possible Resources



Venn Diagram Showing Sets of Numbers

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources

District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows there are rational and irrational numbers. Examples of rational numbers: $\frac{3}{5}$, $\frac{-2}{3}$, 7, 1.36, .3333 . Examples of irrational numbers: π $\sqrt{2}$ .2121121112 .

B. The student is able to distinguish between the representations of rational and irrational numbers.

State Goal	1
District Goal	
Program Goal	2,7,8

Related Area(s) Example: rational 3, -6, .6 ; irrational: $\sqrt{5} = 2.236068$, $\sqrt{2} = 1.414214$

Suggested Activities: Grade(s) 8

Title: Writing Irrational Numbers
Group Size: entire class
Materials: paper, pencil

Procedure(s):

- Have students write or make up four irrational numbers.
- Numbers must be decimal numbers that neither repeat nor terminate.
- Use a "pattern" method to help in your writing of irrational numbers.
- Use three different digits for the second irrational number.
- Use four different digits for the third and five different digits for the last.

Example:

$.\overset{\frown}{13}\overset{\frown}{113}\overset{\frown}{1113}\overset{\frown}{11113}111111\ldots$

$.\overset{\frown}{38}\overset{\frown}{388}\overset{\frown}{3888}\overset{\frown}{38888}\overset{\frown}{388888}\ldots$

- Let one of the irrational numbers that they write (the first one) begin with .1. Then have the students write the digits 0 and 1 in order. (Thus .101) Then have students complete the construction of this irrational number by showing the pattern they developed. Students must use only two different digits.

Example:

$.\overset{\frown}{10}\overset{\frown}{100}\overset{\frown}{1000}\overset{\frown}{10000}1$

- Here are two interesting irrationals. Write the next 4 digits for both.

3.13579113579...____________

2.123124125126...____________

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ____	Suggested Monitoring Procedures	Possible Resources
		District Resources

309

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Suggested Objective Placement 8

State Goal	1
District Goal	
Program Goal	2,7,8

Student Learning Objective(s) A. The student is able to express common fractions as repeating decimals: $\frac{2}{3} \rightarrow 3\overline{)2.00}^{\,.66} \rightarrow .\overline{6}$. B. The student is able to express repeating decimals as common fractions.

$.150 = \frac{15}{100} = \frac{3}{20}$

$$\begin{aligned} n &= .\overline{3}3 \\ 10n &= 3.3\overline{3} \\ -1n &= .3\overline{3} \\ \hline 9n &= 3.00 \end{aligned} \qquad n = \frac{3}{9} = \frac{1}{3}$$

$$\begin{aligned} n &= .\overline{18} \\ 100n &= 18.181\overline{8} \\ -1n &= .181\overline{8} \\ \hline 99 &= 18.0000 \end{aligned} \qquad n = \frac{18}{99} = \frac{2}{11}$$

Related Area(s)

Suggested Activities: Grade(s) 8

Suggested Activities	Suggested Monitoring Procedures	Possible Resources
	Check for legitimate equivalents.	District adopted text.

Title: Concentration with Repeating Decimals

Group Size: pairs, small group

Materials: two sets of cards, (each card of set A has a fraction on its face which will generate a repeating decimal, each of set B has a repeating decimal equal to one of the fractions of set A).

Procedure(s):

- Place both sets, shuffled together, face down on the table.
- Each player draws a card and attempts to draw its equivalent.
- Player with most pairs when all are gone is winner.
- Set A

1/3	5/9	2/3	7/9	1/6	2/9	5/6	1/9

- Set B

$.3\overline{3}$	$.5\overline{5}$	$.6\overline{6}$	$.7\overline{7}$	$.1\overline{6}$	$.2\overline{2}$	$.8\overline{3}$	$.1\overline{1}$

District Resources

Suggested Activities: Grade(s) 8

Title: Bingo
Group Size: entire class
Materials:
- game boards as pictured below
- markers
- cards for common fractions
- similar number of equivalent cards for repeating decimals

Procedure(s):

- The cards are shuffled and placed in a pile face down.
- The caller turns over one card at a time and reads the common fraction or repeating decimal.
- Student covers, with a marker, equivalent names for the numbers read.
- For example, one card might read B two thirds. Cell B4 has $.6\overline{6}$ on it, so students would cover that cell with a marker. Another card might read G POINT ONE SIX. CELL G3 has .16 on it, so students would cover it with a marker.
- Sample Bingo Board:

1	5/9	$.8\overline{3}$	1/9	$.1\overline{1}$	1/3
2	$.\overline{3}$	$.030\overline{3}$	$.\overline{6}$	3/11	5/6
3	1/30	2/9	FREE	$.1\overline{6}$	.2727
4	2/3	$.4\overline{4}$	7/9	$.2\overline{2}$	$.\overline{5}$
5	1/11	$.\overline{7}$	4/9	.0909	1/6
	B	I	N	G	O

Suggested Monitoring Procedures

Possible Resources

District Resources

SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Mathematics

SPECIFIC AREA: Algebraic Expressions

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. the term "variable" means a symbol (usually a letter from the alphabet in lower case) that represents a number(s).	157	7-8					
. the expression 5y means five time the value of y.	157	7-8					
. the expression $\frac{y}{5}$ means y divided by five.	157	7-8					
The student is able to:							
* . solve one step equations by using the addition principle.	161	7-8					
* . solve one step equations by using the multiplication principle.	161	7-8					
* . solve two step equations by using the addition and multiplication principles.	167	8					
. evaluate numerical expressions by using the order of operations. first: ( ) second: x, ÷, left to right third: +, -, left to right Example: $3 \cdot (4-2) + 8 = 3(2) + 8$ $= 6 + 8$ $= 14$	165	7-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
316 CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________ 317

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the term "variable" means a symbol (usually a letter from the alphabet in lower case) that represents a number(s). B. The student knows the expression 5y means five times the value of y. C. The student knows the expression $\frac{y}{5}$ means y divided by five.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2, 8

Suggested Activities: Grade(s) 7 - 8

Title: Algebraic Expressions
Group Size: small group
Materials: 16 small index cards, each card containing a basic phrase

Examples:

- p multiplied by five
- one-fifth of p
- the product of seven and m
- m divided by five
- eight multiplied by a
- a divided by eight
- twice an unknown quantity, n
- an unknown quantity, n, divided by 2

Procedure(s):

- The small group is divided into two teams.
- The cards are shuffled and placed face down.
- Players from each team play in turn.
- One card is turned over at a time, the basic phrase is read aloud and the algebraic expression is given orally or written on the chalkboard.
- For example, if the basic phrase is "p multiplied by 5" the student responds orally or in written form on the chalkboard--"5p."
- If the team member responds correctly the basic phrase card is kept.
- If the team member responds incorrectly the basic phrase card is placed in a discard pile.
- The winner is the team with the most cards after all the cards have been played.

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

Krulik, Stephen, A Handbook of Aids for Teaching Junior-Senior High School Mathematics, W. B. Saunders Co., 1971, pages 45-47.

District Resources

Suggested Activities: Grade(s) ______

Title: Concentration

Group Size: small group, entire class, (divided into two teams)

Materials: large piece of tagboard, clear plastic contact or access to laminator, marking pens, large index cards, masking tape

Procedure(s):

- Draw 25 squares on tagboard.
- Cover with contact or laminate.
- Make 25 flaps to cover squares with index cards and masking tape.
- With washable pen, write 25 algebraic expressions on squares, under flaps, and equivalent forms on 25 index cards.
- Number flaps 1-25.
- Member of one team draws card, shows it to class, and selects a flap.
- If forms are equivalent, flap is removed.
- Team with largest number of flaps wins.
- Instead of using flaps, envelopes could be used, in which case cards with expressions could be placed in the envelopes.
- Example of algebraic expression: $5p$
- Example of equivalent forms: $5.p$, $5\ (p)$, $(5)\ p$, $(5)(p)$, $25\left(\frac{p}{5}\right)$, $5(p^{2-1})$

Suggested Monitoring Procedures

Teacher observation.

Worksheet with algebraic expressions with students writing equivalent forms.

Possible Resources

District adopted text.

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the term "variable" means a symbol (usually a letter from the alphabet in lower case) that represents a number(s). B. The student knows the expression 5y means five times the value of y. C. The student knows the expression $\frac{y}{5}$ means y divided by five

Related Area(s)

State Goal	1
District Goal	
Program Goal	2, 8

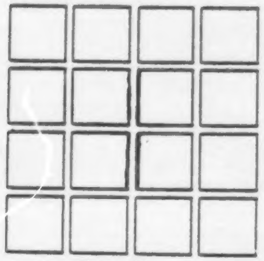
Suggested Activities: Grade(s) 7-8

Title: Concentration Using Algebraic Expressions

Group Size: two students

Materials: concentration gameboard with 16 squares, 16 squares to cover the squares on the gameboard, 8 of one color and 8 of another

CONCENTRATION



Game Board

Procedure(s):

- Let eight of the cards be algebraic expression cards.

Example:

$5p$	$\frac{p}{5}$	$\frac{x}{2}$	$2x$
$7m$	$\frac{m}{7}$	$\frac{n}{3}$	$3n$

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______

- Let eight of the cards be equivalent to other cards.
  Example:

$5 \cdot p$	$\frac{4p}{20}$	$\frac{4x}{8}$	$2(x)$
$(7)m$	$\frac{3m}{21}$	$\frac{3n}{9}$	$3 \cdot n$

- Place all cards face down on the gameboard so that neither player knows which card is which.
- The first player turns up two cards, one of each color.
- If the player turns up a matching pair, he/she keeps these cards and takes another turn.
- If a matching pair was not turned up, the cards are turned face down in their original position after giving the other player a chance to see them.
- The next player turns up two cards and play continues as before.
- When all the cards have been taken, the player with the most cards is the winner.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to solve one step equations by using the addition principle. B. The student is able to solve one step equations by using the multiplication principle.

State Goal	1, 10
District Goal	
Program Goal	5,6,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: What's My Pattern?
Group Size: entire class
Materials: written exercise as below:

Equations	Number to be Multiplied
$\frac{x}{4} = 8$	3
$\frac{x}{3} = 12$	9
$\frac{x}{2} = 4$ ----------------	2
$\frac{x}{9} = 4$	4
$\frac{x}{5} =$	5

Procedure(s):

- Ask the students to draw a dotted line matching the number that must be multiplied to both members of each equality in order to solve the equation.
- One example has been done for you.
- After all the equations have been matched with a number on the right, study the problems to determine what pattern has developed.
- Can you find the pattern that developed?

Title: Cross-Number Puzzles
Group Size: entire class
Materials: Cross-Number Puzzles

Suggested Monitoring Procedures

Have students make up exercises using the "What's My Pattern?" example.

Short quiz with one-step problems using the addition and multiplication principle.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______

Suggested Monitoring Procedures

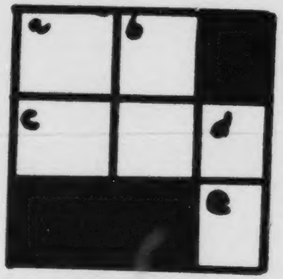
Possible Resources

Procedure(s):

- The purpose of this activity is to provide students with practice exercises with one-step equations in a different format.
- Complete the following cross-number puzzles:

Across

a. $x - = 10$
c. $x - 50 = 52$
e. $x + 5 = 10$

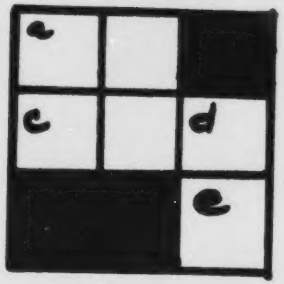


Down

a. $x - 4 = 7$
b. $x - 7 = 3$
d. $x + 13 = 38$

Across

a. $\frac{x}{4} = 3$
c. $\frac{x}{5} = 41$
e. $6x = 30$



Down

a. $2x = 24$
b. $3x = 60$
d. $\frac{x}{5} = 11$

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student is able to solve one step equations by using the addition principle. B. The student is able to solve one step equations by using the multiplication principle.

State Goal	1
District Goal	
Program Goal	6, 8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Kentucky Derby (Roller Derby; Indy 500)

Group Size: small groups (teams of 4-5)

Materials: chalkboard or transparency, toy horses or cards, 3 x 5 cards on which problems have been written

Procedure(s):

- A team advances its horse by correctly solving problems.
- A correct answer moves the horse to the next furlong marker.
- The game can be made to fit the interests of the class just by changing the name to "Roller Derby" or "Indy 500." The same rules apply except that laps are counted instead of furlongs.
- An arbitrary number of laps may be set at the discretion of the teacher.

Addition example:

$$\boxed{\begin{array}{l} b - 3 = 8 \\ b = \end{array}}\qquad\boxed{\begin{array}{l} x - \frac{1}{8} = 2\frac{3}{8} \\ x = \end{array}}$$

Multiplication example:

$$\boxed{\begin{array}{l} \frac{x}{3} = 5 \\ x = \end{array}}\qquad\boxed{\begin{array}{l} \frac{b}{12} = 6 \\ b = \end{array}}$$

Suggested Monitoring Procedures

Worksheet with equations using the addition principle and the multiplication principle.

Students having difficulty with the worksheet should be grouped for reteaching.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______

Title: What's My Pattern?
Group Size: entire class
Materials: written exercise as below

Equation	Number to be added
$x - 2 = 8$	5
$x - 5 = 4$	2
$x - 9 = 1$	1
$x - 1 = 4$	4
$x - 4 = 8$	9

Procedure(s):

- Ask the students to draw a dotted line matching the number that must be added to both members of each equality in order to solve the equation.
- One example has been done for you.
- After all equations have been matched with a number on the right, study the problems to determine what pattern has developed.
- What pattern has developed?

Suggested Monitoring Procedures

Check written exercise and pair students having difficulty with more able students for assistance and drill.

Possible Resources

District adopted text.

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) The student is able to evaluate numerical expressions by using the order of operations.

first: ( )
second: x, ÷, left to right
third: +. -, left to right
Example: 3 . (4-2) + 8 = 3(2) + 8
= 6 + 8
= 14

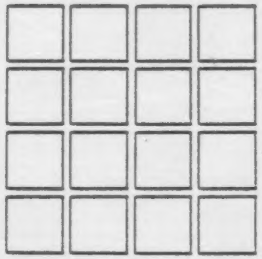
State Goal	1
District Goal	
Program Goal	2,6,8

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Concentration with Numerical Expressions
Group Size: two students
Materials: concentration gameboard with 16 squares to cover the squares on the gameboard, 8 of one color and 8 of another.

CONCENTRATION



Game Board

Procedure(s):

- Let 8 of the cards be numerical expression cards.
  Example:

5 + 3 x 7	7 = (6=1)	8 - (413)	7 x (24)
48 ÷ 8 - 4	(2=3 x 1	18 - 4 = 3	14 = 8 ÷

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______

- Let 8 of the cards be answer cards that match the numerical expressions.
- Place all cards face down on the gameboard so that neither player knows which card is which.
- The first player turns up two cards, one of each color.
- If the player turns up a matching pair, he/she keeps these cards and takes another turn.
- If a matching pair was not turned up, the cards are turned face down in their original position after giving the other player a chance to see them.
- The next player turns up two cards and play continues as before.
- When all the cards have been taken, the player with the most cards is the winner.

__Title__: Dominoes With Numerical Expressions

__Group Size__: pairs, small group

__Materials__: domino set made from tagboard (Cut tagboard into 2.5x5 cm rectangles, on one end write a numerical expression, on the other end write a number. Take care that a numerical expression on one domino will be equivalent to a number on another)

__Procedure(s)__:
- Place dominoes face down on the table.
- Each player chooses five.
- Another domino is placed face up on the table and is the starting domino.
- Players must draw one domino from the unplayed, unchosen dominoes if he/she cannot play from his/her own stack.
- First player to play his/her last domino is the winner.

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

District adopted text.

District Resources

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Suggested Objective Placement 8

Student Learning Objective(s) The student is able to solve two step equations by using the addition and multiplication principles.

State Goal	1, 10
District Goal	
Program Goal	5, 6, 8

Related Area(s)

Suggested Activities: Grade(s) 8

- If the question is answered correctly, the player receives the money alloted to that question.

  Note: Gameboard
- The players choose categories in turn after each question is successfully answered.
- The player with the most money after all questions have been answered is the winner.

  Example of Jeopardy Gameboard:

	+	-	-	x	2 step problem
$10	$x+1 = 5$	$x-1 = 9$	$\frac{x}{2} = 4$	$2y = 6$	$2x+1 = 7$
$20	$x+2 = 8$	$x-5 = 31$	$\frac{x}{3} = 7$	$4z = 28$	$3x-1 = 8$
$30	$x+10 = 25$	$x-8 = 64$	$\frac{x}{9} = 8$	$7n = 49$	$\frac{x}{4} + 2 = 4$
$40	$x+10 = 154$	$x-10 = 110$	$\frac{x}{12} = 15$	$12x = 144$	$\frac{y}{7} + 1 = 9$
$50	$x+9 = 148$	$x-8 = 60$	$\frac{x}{17} = 24$	$13X = 139$	$4x+8 = 9$

- Note: To solve an equation that has addition or subtraction, the addition property of equations is used. To solve an equation that has multiplication or division, the multiplication property of equations is used.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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Suggested Objective Placement 8

Student Learning Objective(s) A. The student is able to solve two step equations by using the addition and multiplication principles.

State Goal	1,10
District Goal	
Program Goal	5,6, 8

Related Area(s)

Suggested Activities: Grade(s) 8

Title: Number Code
Group Size: individual, entire class
Materials: number code sheet, direction sheet

Procedure(s):

- Have students solve two step equations and use answers to answer "number codes questions."

  Direction Sheet:
  Solve the following two step equations. Circle the answer in the right spot on the number code sheet and connect each circle with a straight line in order to make a letter. In this case three letters will make a word.

Number Code Sheet

1	7	13	1	7	13	1	7	13
2	8	14	2	8	14	2	8	14
3	9	15	3	9	15	3	9	15
4	10	16	4	10	16	4	10	16
5	11	17	5	11	17	5	11	17
6	12	18	6	12	18	6	12	18
	1st letter			2nd letter			3rd letter	

Suggested Monitoring Procedures

Quiz with two step equation. Students are to use addition and multiplication principles to solve the problems.

Possible Resources

District adopted text.

District Resources

Letter one	Letter Two	Letter Three
$\frac{x}{3} + 2 = 3$	$\frac{w}{2} + 3 = 3\frac{1}{2}$	$3a - 4 = 14$
$2x + 3 = 5$	$4w - 3 = 21$	$2a - 14 = 0$
$4x + 2 = 14$	$2w - 18 = 18$	$\frac{a}{3} + 2 = 6$
$\frac{x}{5} - 2 = 1$	$\frac{13}{w} - 1 = 0$	$3a - 26 = 13$
$\frac{x}{3} - 6 = 0$		$\frac{18}{a} + 5 = 6$
$2x - 4 = 8$		

- The number code word is S U M.

Title: Jeopardy
Group Size: small group
Materials: dice, Jeopardy gameboard, clickers, play money ($25 to each student at start of play), problem cards (25)

Procedure(s):

- Teacher acts as MC or selects a student to act as MC.
- Problem cards are placed face down in each space on the gameboard.
- The highest dice roll determines the student who plays first.
- Order of turns is to that player's left.
- The first player chooses a category from which to answer a question. For example, Addition for $20.
- When the MC reads the question, the players contend for the right to answer that question by clicking the clicker or raising hands.
- The player who fails to answer a question gives the MC $5.00.

Suggested Monitoring Procedures

Give students a short quiz with two-step problems using the addition and multiplication principles. Group students having difficulty for re-teaching.

Possible Resources

District adopted text.

District Resources

SUBJECT: Mathematics

SPECIFIC AREA: Numeration: Number Theory

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. whole numbers are either even or odd.	173	4					
. a prime number is a number divisible by 1 and itself only.	173	5-8					
. numbers that are divisible by a number other than 1 and itself are composite.	175	6-8					
. a composite number can be expressed as the product of primes in only one way (24=2·2·2·3).	175	6-8					
. the greatest common factor (g.c.f.) of two or more numbers is the largest of the common divisors of the numbers.	181	6-8					
. the least common multiple (l.c.m.) of two or more numbers is the smallest of the common multiples of the numbers.	189	6-8					
. there are divisibility tests for 2, 3, 4......10 (except 7) and they can be used to help factor.	177	6-8					
The student is able to:							
. find the primes less than 100.	173	5-6					
. do a prime factorization of a number.	177	6-8					
* . find the g.c.f. of two or more numbers: 18 = 2·3·3 24 = 2.2.2.3 g.c.f. = 2.3 = 6	181	6-8					
* . find the l.c.m. of two or more numbers: 8 = 2·2·2 l.c.m. = 2·2·2·3 6 = 2·3 = 24	189	6-8					
. use divisibility tests for 2, 3 and 5 as an aid in finding the prime factorization.	177	6-8					
The student values:							
. numbers as a natural phenomenon and not man-made.	173	4-8					
. numerals as the symbols we use to represent numbers.	173	4-8					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows whole numbers are either even or odd. B. The student knows a prime number is a number divisible by 1 and itself only. C. The student is able to find the primes less than 100. D. The student values numbers as a natural phenomenon and not man-made

Related Area(s) E. The student values numerals as the symbols we use to represent numbers.

State Goal	1
District Goal	
Program Goal	1,2,8

Suggested Activities: Grade(s) 7-8

Title: Sieve of Eratosthenes
Group Size: entire class
Materials: pencil, graph paper

Procedure(s):

- Explain to students that the Greek mathematician Eratosthenes discovered a way of finding prime numbers around 200 B.C. It is called the Sieve of Eratosthenes and can be made by following the steps below:
  - Students make a chart from 1-100 on graph paper.
  - Cross out #1 (1 is not a prime).
  - Circle #2, then cross out all multiples of 2.
  - Circle #3, then cross out all multiples of 3.
  - Circle #5, then cross out all multiples of 5.
  - Circle #7, then cross out all multiples of 7.
  - Circle all remaining numbers.
  - They are all prime.

Example:

~~1~~	②	③	~~4~~	⑤	~~6~~	⑦	~~8~~	~~9~~	~~10~~
⑪	~~12~~	⑬	~~14~~	~~15~~	~~16~~	⑰	~~18~~	⑲	~~20~~
~~21~~	~~22~~	㉓	~~24~~	~~25~~	~~26~~	~~27~~	~~28~~	㉙	~~30~~
㉛	~~32~~	~~33~~	~~34~~	~~35~~	~~36~~	㊲	~~38~~	~~39~~	~~40~~
㊶	~~42~~	㊸	~~44~~	~~45~~	~~46~~	㊼	~~48~~	~~49~~	~~50~~
~~51~~	~~52~~	(53)	~~54~~	~~55~~	~~56~~	~~57~~	~~58~~	(59)	~~60~~
(61)	~~62~~	~~63~~	~~64~~	~~65~~	~~66~~	(67)	~~68~~	~~69~~	~~70~~
(71)	~~72~~	(73)	~~74~~	~~75~~	~~76~~	~~77~~	~~78~~	(79)	~~80~~
~~81~~	~~82~~	(83)	~~84~~	~~85~~	~~86~~	~~87~~	~~88~~	(89)	~~90~~
~~91~~	~~92~~	~~93~~	~~94~~	~~95~~	~~96~~	(97)	~~98~~	~~99~~	~~100~~

319

- How many prime numbers are there between 1-100? (25)

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

350

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

351

352

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows numbers that are divisible by a number other than 1 and itself are composite. B. The student knows a composite number can be expressed as the product of primes in only one way (24 = 2·2·2·3). C. The student values numbers as a natural phenomenon and

Related Area(s) not man-made. D. The student values numerals as the symbols we use to represent numbers.

State Goal	1
District Goal	
Program Goal	1,2,6,7

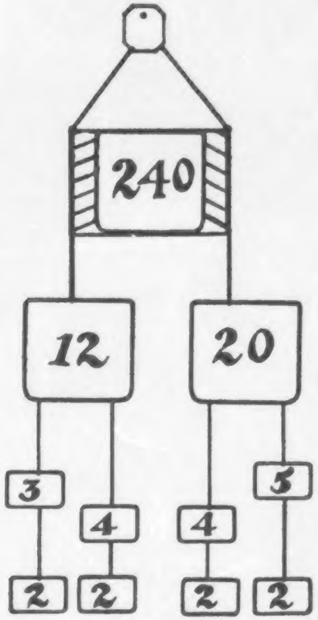
Suggested Activities: Grade(s) 7-8

Title: Prime Factor Mobiles
Group Size: any number
Materials: index cards, string, wire

Procedure(s):

- Establish the process of determining factor trees for composite numbers.
- Write the appropriate factor numbers on the index cards and construct the two branches for each of the factors, extending the branches downward as needed.

Example:



Suggested Monitoring Procedures

Possible Resources

Macmillan Mathematics, Teacher's Edition, Thoburn, Tina, et al, 1976, pages 285A, 304, 305.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHO S PROJECT - Working Copy

Suggested Objective Placement 6-8

State Goal	1
District Goal	
Program Goal	2,3,6,7

Student Learning Objective(s) A. The student knows there are divisibility tests for 2,3,4...10 (except 7) and they can be used to help factor. B. The student is able to do a prime factorization of a number. C. The student is able to use divisibility tests for 2,3 and 5 as an aid in finding the prime factorization.

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Factor Rummy
Group Size: groups of 4-5
Materials: 60-80 cards numbered from 2-200 (or higher depending on the ability level), dice

Procedure(s):

- All the cards are dealt.
- The dice are rolled.
- Each player plays only one card face down that is a multiple of the number showing on the dice.
- If the number 10 shows on the dice, let that be considered the opportunity to lay down any prime number a player might have.
- When everyone has played, the cards are turned over and examined.
- If anyone plays an incorrect card, he/she must take all those cards from that round into his/her hand.
- If more than one person plays an incorrect card, they divide the cards.
- If no one makes a mistake, the cards go into a discard pile and are not used during the rest of the game.
- A player is not penalized for not playing during a round.
- When the round is completed, the dice are rolled again and the procedure repeated.
- The winner is whoever can get rid of all his/her cards.

Suggested Monitoring Procedures

Observe progress of game.

Possible Resources

District adopted text.

District Resources

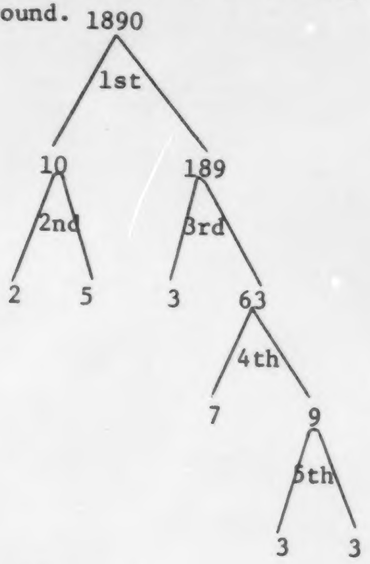
Suggested Activities: Grade(s) 7-8

Title: Prime Factorization
Group Size: entire class
Materials: pencil, paper

Procedure(s):

- Each row is a team.
- The teacher gives a large number to the class.
- The first person in each row completes the first step in a factor tree and passes the paper back to the next person.
- The second person completes another step in the factor tree and passes the paper back.
- The paper is passed back with each person completing only one step in the factor tree until the prime factorization is found.
- If the prime factorization isn't found by the end of the row, or if a team member or teacher finds a mistake, the paper should go back to the first person to start the problem again.
- When the prime factorization is found, that person puts the whole factor tree on the board, and that row wins that round.

Example:



1[illegible]0 = $2 \times 3^3 \times 5 \times 7$

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows there are divisibility tests for 2,3,4...10 (except 7) and they can be used to help factor. B. The student is able to do a prime factorization of a number. C. The student is able to use divisibility tests for 2,3 and 5 as an aid in finding the prime factorization.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,3,6,7

Suggested Activities: Grade(s) 7-8

Title: Tests for Divisibility
Group Size: entire class
Materials: worksheet

Procedure(s):

- Worksheet is a 7 x 7 array of squares with large numbers in each square.
- The idea is to cross out multiples of whatever number is being used at that time.

  Example:
  The teacher will say, "three's" and the students cross out all multiples of three in a certain time limit using the test for divisibility by three.
- If no one gets a Bingo (fill in a line), then another number can be used until someone wins.

Variation:

- Students cross out multiples of four using the divisibility test for 4.

Example:

18	27	35	40	15	10	8
49	81	75	63	55	42	7
24	35	34	48	63	32	22
36	50	51	25	20	54	56
28	16	60	76	64	84	88
62	80	93	95	102	69	72
100	70	105	30	99	90	21

Suggested Monitoring Procedures

Possible Resources

District adopted test

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

State Goal	1
District Goal	
Program Goal	2,3,7

Student Learning Objective(s) A. The student knows the greatest common factor (g.c.f.) of two or more numbers is the largest of the common divisors of the numbers. B. The student is able to find the g.c.f. of two or more numbers:

$$\begin{aligned} 18 &= 2\cdot3\cdot3 \\ 24 &= 2\cdot2\cdot2\cdot3 \qquad \text{g.c.f.} = 2\cdot3 \\ &\qquad\qquad\qquad\quad = 6 \end{aligned}$$

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Euclid's Method of Finding G.C.F.
Group Size: entire class
Materials: paper, pencil

Procedure(s):

- Give two fairly large numbers to the class.
- The first person in each row works the first step in Euclid's Method and hands the paper back to the next person.
- The second person works the second step and passes the paper back.
- The paper is continually being passed until someone finds the G.C.F. of the two original numbers.

Note: In Euclid's Method divide the larger number by the smaller one first, then divide the divisor by the remainder, repeating this process until the remainder is zero. The G.C.F. is the last non-zero remainder.

Example:

28 and 242

Divide

$$\begin{array}{r} 8 \\ ㉘\,\overline{)242} \\ \underline{224} \\ ⑱ \end{array}$$

$$\begin{array}{r} 1 \\ ⑱\,\overline{)28} \\ \underline{18} \\ ⑩ \end{array}$$

$$\begin{array}{r} 1 \\ ⑩\,\overline{)18} \\ \underline{10} \\ ⑧ \end{array}$$

Suggested Monitoring Procedures

Possible Resources

District adopted text.

SEA MATH: Seattle Mathematics Program
Seattle Public Schools
815 Fourth North
Seattle, Wn. 98109
1975

District Resources

Suggested Activities: Grade(s) 7-8

Suggested Monitoring Procedures

Possible Resources

$$\begin{array}{r} 1 \\ \textcircled{8}\,\overline{)10} \\ 8 \\ \textcircled{2} \end{array}$$

$$\text{G.C.F.} = \textcircled{2}\,\begin{array}{r} 4 \\ \overline{)8} \\ \underline{8} \\ \textcircled{0} \end{array}$$

Title: Reverse Times Tables
Group Size: class drill
Materials: chalkboard

Procedure(s):

- Two numbers on board, each set being answers from the multiplication tables of one series (8 and 24).
- The class response might be 2, 4, or 8 with 8 the preferred answer.
- Daily drill will increase awareness of G.C.F.

Title: Factor Grid
Group Size: any number
Materials: factor grid worksheet, as needed

Procedure(s):

- Complete the patterns of dots (left to right, every dot in 1 column, every second dot in 2's column, every third dot in 3's column, etc.)
- Read the chart vertically to determine the greatest common factor (for 6 and 9 the highest level where both have dots is 3).
- Find the greatest common factor for

A.	36 and 24	(12)	C.	24 and 40	(8)
B.	8 and 28	(2)	D.	20 and 40	(20)

- Check by finding and multiplying the common prime factors of the given two or more numbers.
- Use Euclid's Method of finding the G.C.F.
  Given 306 and 414 divide the larger by the smaller

$$\begin{array}{r} 1 \text{ R. } 108 \\ \textcircled{306}\,\overline{)414} \\ \underline{306} \\ 108 \end{array}$$

District Resources

SMALL SCHO PROJECT - Working Copy

Suggested Objective Placement 6-8

State Goal	1
District Goal	
Program Goal	2,3,7

Student Learning Objective(s) A. The student knows the greatest common factor (g.c.f.) of two or more numbers is the largest of the common divisors of the numbers. B. The student is able to find the g.c.f. of two or more numbers:

$$\begin{array}{l} 18 = 2\cdot 3\cdot 3 \\ 24 = 2\cdot 2\cdot 2\cdot 3 \qquad \text{g.c.f.} = 2\cdot 3 \\ \qquad\qquad\qquad\qquad\quad\;\; = 6 \end{array}$$

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources

Divide the divisor by the remainder.

$$\begin{array}{r@{\,}r} & 2 \\ \textcircled{108} & \overline{)306} \\ & \underline{216} \\ & 90 \end{array}$$

Repeat until the remainder is 0.

$$\begin{array}{r@{\,}r@{\;}l} & 1 & \text{R. } 18 \\ \textcircled{90} & \overline{)108} & \\ & \underline{90} & \\ & 18 & \end{array}$$

The G.C.F. is the last non-zero remainder. (18)

$$\begin{array}{r@{\,}r@{\;}l} & 5 & \text{R. } 0 \\ \textcircled{18} & \overline{)90} & \\ & \underline{90} & \end{array}$$

Exercise: Find the G.C.F. of

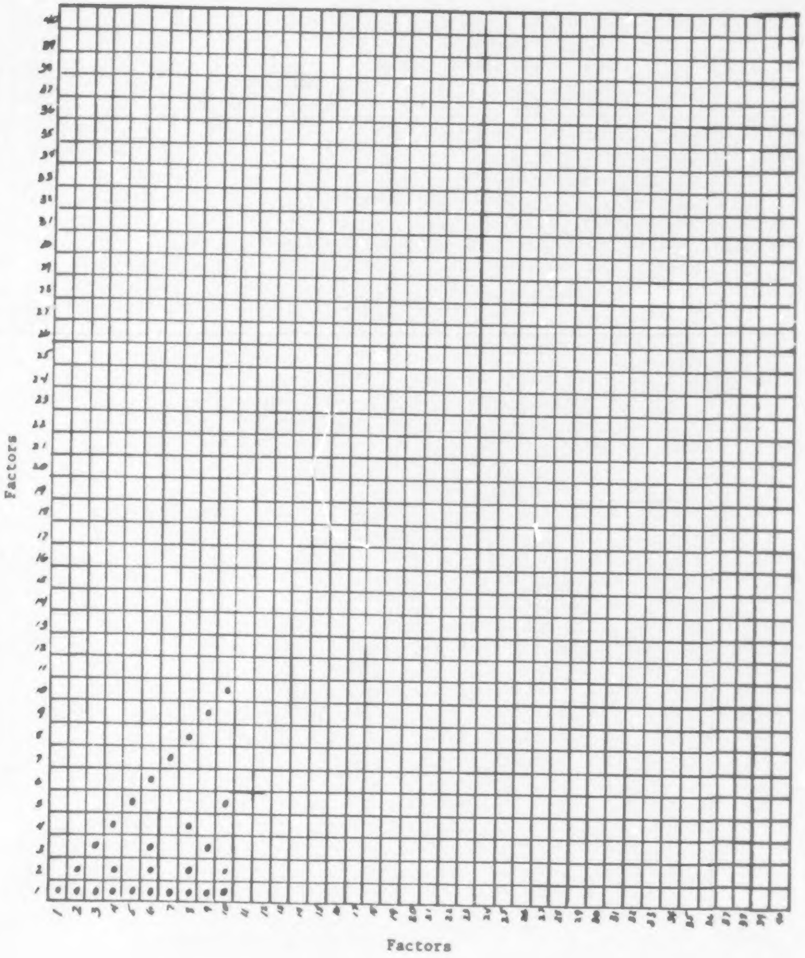
A. 108 and 132 (4)

See overleaf for illustration.

District Resources

Suggested Activities: Grade(s) ______

Factor Grid



Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows numbers that are divisible by a number other than 1 and itself are composite. B. The student knows a composite number can be expressed as the product of primes in only one way (24 = 2·2·2·3). C. The student values numbers as a natural phenomenon and

Related Area(s) not man-made. D. The student values numerals as the symbols we use to represent numbers.

State Goal	1
District Goal	
Program Goal	1,2,6,7

Suggested Activities: Grade(s) 7-8

Title: Concentration with Composites
Group Size: two players
Materials: concentration gameboard with 16 squares

Procedure(s):

- Sixteen cards (squares) to cover the squares on the gameboard, eight of one color and eight of another.
- Eight of the cards are composite numbers for example:

24	4	14	6	48	36	81	9

- Eight of the cards have composite numbers expressed as the product of primes for example:

2·2·2·3	2·2	7·2	3·2	3·2·2·2·2	3·2·3·2
	3·3·3·3		3·3		

- Place all cards face down on the gameboard so that neither player knows which card is which.
- The first player turns up two cards, one of each color.
- If the player turns up a matching pair he/she keeps the cards and takes another turn.
- If a matching pair was not turned up, the cards are turned face down in their original position after giving the other player a chance to see them.
- The next player turns up two cards and play continues.

Suggested Monitoring Procedures

Give students a list of composite numbers and have them express the composite as the product of primes, i.e., 24 = 2·2·2·3

Possible Resources

District adopted text.

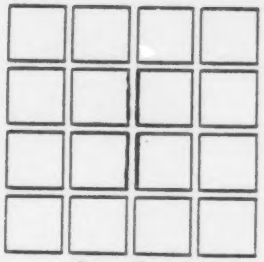
District Resources

Suggested Activities: Grade(s) 7-8

- When all the cards have been taken, the player with the most cards is the winner.

Example of Gameboard:

CONCENTRATION



Game Board

Suggested Monitoring Procedures

Possible Resources

District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows the greatest common factor (g.c.f.) of two or more numbers is the largest of the common divisors of the numbers. B. The student is able to find the g.c.f. of two or more numbers: $18 = 2 \cdot 3 \cdot 3$, $24 = 2 \cdot 2 \cdot 2 \cdot 3$, g.c.f. $= 2 \cdot 3 = 6$

State Goal	1
District Goal	
Program Goal	2,3,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: G.C.F. The Prime Factorization Way

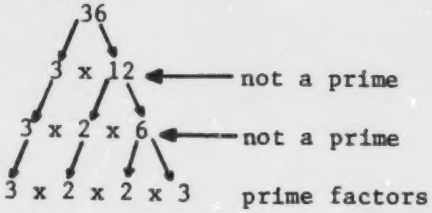
Group Size: entire class, small group

Materials: chalkboard, overhead, worksheet

Procedure(s):

- Review prime factorization of a number with the group.
- Point out that prime factorization can be used to find the G.C.F.
- Write a number on the chalkboard or overhead and show how a "factor tree" can be used to determine the prime factors.

i.e.



The prime factorization of 36 is 3x2x2x3

- Put two numbers on the chalkboard and have the class determine the prime factors. List them as follows and circle the prime factors common to both.

i.e.

20: 2 x 2 x 5
50: 2 x 5 x 5

- Point out that both numbers have one 2 and one 5 as factors. Therefore, the G.C.F. of 20 and 50: 2 x 5 or 10 (Product of the prime factor common to both numbers).

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Suggested Resources
. Demonstrate with several other numbers how to find the prime factors and the G.C.F. . Give students a worksheet and suggest they use similar patterns to find the G.C.F.		
		District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows the least common multiple (l.c.m.) of two or more numbers is the smallest of the common multiples of the numbers. B. The student is able to find the l.c.m. of two or more numbers:

$8 = 2 \cdot 2 \cdot 2$ l.c.m. $= 2 \cdot 2 \cdot 2 \cdot 3$
$6 = 2 \cdot 3$ $= 24$

State Goal	1
District Goal	
Program Goal	2,3,6,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Multiple Rummy
Group Size: groups of 4-5
Materials: #1 - deck of 60-80 cards numbered from 2-40 (or higher depending on ability level); #2 - deck of 20 cards numbered from 8-40 (composite numbers only)

Procedure(s):

- Deal all the cards from Deck #1.
- Place Deck #2 face down in middle of table.
- Turn over first card in Deck #2.
- Each student plays two cards face down from his hand that have the card from Deck #2 as their least common multiple.
- When all have played, turn over cards and examine.
- If anyone plays an incorrect card, he/she must take all those cards played from that round into his/her hand.
- If two or more people play an incorrect card, they will split the cards from that round.
- If no one makes a mistake, the cards are set aside until the next game.
- A player is not penalized for passing (not playing) during a round.
- If a player can find three cards that have the same L.C.M., he can play them all at once.
- When the round is completed, another card from Deck #2 is turned over and the procedure is repeated.
- The winner is whoever can get rid of all his/her cards or whoever has the fewest at the end of the time period.

Suggested Monitoring Procedures

Give students a series of numbers with common multiples and ask them to circle the L.C.M. of the two numbers.
i.e.
3: 3, 6, 9, 12, 15, 18, 21, 24....
4: 4, 8, 12, 16, 20, 24, 28, 32....

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows the least common multiple (l.c.m.) of two or more numbers is the smallest of the common multiples of the numbers. B. The student is able to find the l.c.m. of two or more numbers: 8 = 2·2·2 l.c.m. = 2·2·2·3
6 = 2·3 = 24

State Goal: 1
District Goal:
Program Goal: 2,3,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: L.C.M. The Prime Way
Group Size: entire class or small groups
Materials: overhead, chalkboard, worksheet

Procedure(s):

- List on the chalkboard or overhead the multiples of two numbers. i.e. 3 and 4
  3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33....
  4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44....
- Ask students which multiples are common (12, 24).
- Ask students to indicate the least common multiple of 3 and 4 (12).
- Repeat the process with other numbers.
- Indicate to the students that the L.C.M. is always greater than or equal to the greater number.
- Use two numbers to demonstrate how prime factorization can be used to find the L.C.M.

```
i.e. 10:  2       x 5
     21:  |    3  |    x 7
          ↓    ↓  ↓      ↓
          2 x  3 x 5  x  7 = 210
```

- Point out that the L.C.M. of two or more numbers consist of the smallest product of prime numbers that contains every prime factor of every number.
- Demonstrate with a second set of numbers.

```
i.e. 18:           2 x 3 x 3
     24:  2 x 2 x 2 x 3    |
          ↓   ↓   ↓   ↓    ↓
          2 x 2 x 2 x 3 x  3 or 72
```

The LCM of 18 and 24 is 72.

Suggested Monitoring Procedures

Give students five incomplete problems using prime factorization to find the L.C.M. and ask them to complete the problems.
i.e.
The L.C.M. of 40 and 60
40: 2
60: 5
2 5 = 120

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7-8

The L.C.M. of 18 and 24 is 72.

- Note that no extra factors are used in the L.C.M. i.e.

$$\underbrace{2\times 2\times \mathrlap{\overbrace{}^{18}}2\times 3}_{24}\times 3$$

- Give students a worksheet two or more numbers and have students use prime factorization to find L.C.M.'s.

Title: Dominoes
Group Size: groups of 2-3
Materials: 30-40 tiles (wood, cardboard),

Procedure(s):

- Players follow the rules of dominoes, matching the side with 1 number to the side with 2 numbers.
- The 1 number side has to be the L.C.M. of the 2 number side.
- If a player is unable to play, he/she must draw from a pile of 10 extras which are set aside for that purpose.

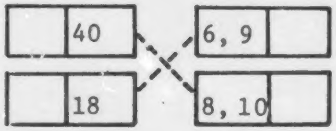
Possible Dominoes:

6,9	60	10,12	40	4,10	36	4,9	20
9,12	48	4,5	12	8,12	18	12,16	12
8,10	15	3,5	48	4,9	18	2,9	40
4,12	40	5,8	15	3,4	15	5,15	20
3,16	20	4,5	18	3,15	60	4,15	36

(Should make at least 2 of each, varying the combinations.)

Suggested Monitoring Procedures

Give students a worksheet with his/her rows of dominoes (similar to the game only leave one side blank as shown). Students are to draw lines from the two numbers to its L.C.M. i.e.



Possible Resources

District Resources

SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: **Mathematics**

SPECIFIC AREA: **Numeration: Scientific Notation -- Exponents**

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. exponential form is an expression of the form M^b.	195	6-8					
. M^b means M as a factor b times ($5^4 = 5.5.5.5$).	195	6-8					
. in M^b, M is the base and b is the exponent.	195	6-8					
. expressing a number in scientific notation is writing it as a number between 1 and 10 multiplied by a power of 10, i.e., $251 = 2.51 \times 10^2$.	197	7-8					
. M^{-b} means $\frac{1}{M}$ (the inverse M^b), i.e., $10^{-2} = \frac{1}{10}2$.	195	8					
. $M^x \cdot M^y = M^{x+y}$ ($3^2 \cdot 3^4 = 3^6$).	195	8					
. $M^x \div M^y - M^{x-y}$ ($2^6 \div 2^4 - 2^2$)	203	8					
The student is able to:							
* . evaluate an exponential expression, i.e., $2^3 = 2 \cdot 2 \cdot 2 = 8$.	195	6-8					
. name a decimal number including negative exponents in scientific notation: $358 = 3.58 \times 10^2$ $.00012 - 1.2 \times 10^{-4}$	197	7-8					
. name a number, including negative exponents in scientific notation in decimal form: $2.65 \times 10^3 = 2650.$ $6.5 \times 10^{-3} = .0065$	199	7-8					
The student values:							
. scientific notation as a simplified expression of very large or very small numbers.	197	6-8					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows exponential form is an expression of the form M^b. B. M^b means M as a factor b times ($5^4 = 5\cdot5\cdot5\cdot5$). C. The student knows in M^b, M is the base and b is the exponent. D. The student knows M^{-b} means $\frac{1}{M^b}$ (the inverse M^b), i.e., $10^{-2} = \frac{1}{10^2}$. E. The student knows $M^x M^y = M^{x+y}$ ($3^2 \cdot 3^4 = 3^6$). F. The student knows $M^x \div M^y = M^{x-y}$ ($2^6 \div 2^4 = 2^2$). G. The student is able to evaluate an exponential expression, i.e., $2^3 = 2\cdot2\cdot2 = 8$.

State Goal	1
District Goal	
Program Goal	2,3

Suggested Activities: Grade(s) 8

Title: Concentration: Using Exponents
Group Size: partners
Materials: concentration gameboard with 16 squares

Procedure(s):

- Make 16 squares to cover squares on the gameboard, 8 of one color and 8 of another.
- On 8 of the cards write numerals, using exponents.

Example:

10^{-1}	2^0	2^{-4}	5^3	3^{-3}	7^{-2}	7^2	4^2

- On 8 of the cards express the equivalent of the numerals above without using exponents.

Example:

$\frac{1}{10}$	1	$\frac{1}{16}$	125	$\frac{1}{27}$	$\frac{1}{49}$	49	16

- Place the cards face down on the gameboard so that neither player knows which card is which.
- The first player turns up two cards, one of each kind if different colors have been used.
- If the player turns up a matching pair, he/she keeps these cards and takes another turn. If a matching pair was not turned up, the cards are turned face down in their original position after giving the other player a chance to see them.

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

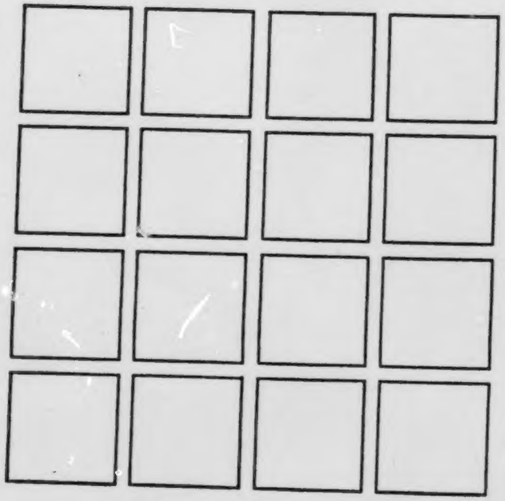
District adopted text.

District Resources

Suggested Activities: Grade(s) 8

- The next player turns up two cards and the play continues as before.
- When all cards have been taken, the player with the most cards is the winner.

CONCENTRATION



Game Board

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Objective Placement 7-8

State Goal	1,8
District Goal	
Program Goal	2,3,7

Student Learning Objective(s) A. The student knows expressing a number in scientific notation is writing it as a number between 1 and 10 multiplied by a power of 10, i.e., $251=2.51x10^2$. B. The student is able to name a decimal number including negative exponents in scientific notation: $358=3.58x10^2$ $.00012-1.2x10^{-4}$. C. The student values scientific notation as a simplified expression of very large or very small numbers.

Suggested Activities: Grade(s) 7-8

Title: Scientific Notation Concentration

Group Size: pairs, small group

Materials: 2 sets of cards, set A having a very large or very small number in decimal notation and set B having an equivalent of one card of set A written in scientific notation.

Procedure(s):

- Shuffle together and lay face down.
- Each player in turn turns up one card and tries to turn a second up which is equivalent to the first.
- If the cards match, player draws again.
- Play continues until all cards have been removed.
- Player with most pairs is the winner.

Example: Set A in decimal notation:

.0000021	.00000174	.00384	.000148
.00257	.0000196	.0000352	.000172

Suggested Monitoring Procedures

Observation of activity.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) 7-8

Example: Set B in scientific notation:

2.10×10^{-6}	1.74×10^{-6}	3.84×10^{-3}	1.48×10^{-4}
2.57×10^{-3}	1.96×10^{-5}	3.52×10^{-5}	1.72×10^{-4}

Title: Minute Match-up
Group Size: entire class
Materials: worksheet

Procedure(s):

- Match decimal numbers with scientific notation equivalent.

Kind of Radiation	Average Wavelength (Meters)	
Violet	.000000394	5.08×10^{-7}
Blue	.000000508	6.59×10^{-7}
Yellow	.00000058	6.5×10^{-11}
Red	.000000659	5.8×10^{-7}
X-Rays	.000000000482	3.94×10^{-7}
Gamma Rays	.000000000065	4.82×10^{-10}

Suggested Monitoring Procedures

Teacher perusal of the worksheet. Group students having difficulty with the concept for reteaching.

Possible Resources

District adopted text.

District Resources

SMALL SCHOOL PROJECT

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows expressing a number in scientific notation is writing it as a number between 1 and 10 multiplied by a power of 10, i.e., $251=2.51\times10^2$. B. The student is able to name a number, including negative exponents in scientific notation in decimal form:

$2.65\times10^3 = 2650.$

$6.5\times10^{-3} = .0065$

C. The student values scientific notation as a simplified expression of very large or very small numbers.

State Goal	1,10
District Goal	
Program Goal	2,3,8

Suggested Activities: Grade(s) 7-8

Suggested Monitoring Procedures

Possible Resources

Title: Tic-Tac-Toe
Group Size: pairs
Materials: 9 numbers on cards that are to be written in scientific notation, an answer key

Procedure(s):

- The 9 problem cards are placed face down to correspond to the spaces on a Tic-Tac-Toe board.
- The players decide where they would like to place their "X" or "O "
- Players play in turn and attempt to answer the problem for the space they have chosen.
- The first student to get three answers correct in a row, column or diagonal wins.
- Sample gameboard with cards placed face down. Write each in scientific notation:

8,000,000	.00032	.002
.0169	.000000123	412,000
700	213,000,000	3940

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

402

403

SMALL SCHO PROJECT - Working Copy

Suggested Objective Placement 8

Student Learning Objective(s) The student knows M^{-b} means $\frac{1}{M^b}$ (the inverse M^b), i.e., $10^{-2}=\frac{1}{10^2}$.

State Goal	1,8
District Goal	
Program Goal	2,3,7

Related Area(s)

Suggested Activities: Grade(s) 8

Title: Ordering Integers with Negative Exponents

Group Size: entire class

Materials: a set of integers with negative exponents

Procedure(s):

- Tell the students that they are to be given a set of integers with negative exponents that they are to order according to size, the largest on the left and the smallest on the right.
- Visual inspection will probably be a very slow and difficult method of ordering the terms.
- What action should you take in order to make your task easier? (Answer: Write the inverse of each term for ease of ordering.)
- Example: Set to order:

3^{-2}, 5^{-3}, 10^{-2}, 4^{-3}, 2^{-4}, 6^{-2}

Suggested Monitoring Procedures

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 8

Student Learning Objective(s) A. The student knows $M^x \cdot M^y = M^{x+y}$ ($3^2 \cdot 3^4 = 3^6$). B. The student knows $M^x \div M^y = M^{x-y}$ ($2^6 \div 2^4 = 2^2$).

State Goal 1,10

District Goal

Program Goal 2,3,6

Related Area(s)

Suggested Activities: Grade(s) 8

Title: Bingo

Group Size: entire class

Materials: Bingo gameboard as shown below, markers, multiplication and division involving numerical expressions with exponents

Procedure(s):

- The caller reads the multiplication and division problems using exponents.
- For example, one card might read "B3 squared times 3 to the fourth power". CELL B3 has 3^6 on it. A marker is placed on that cell.
- A second card might read "02 to the eighth power divided by 2 squared." Cell 03 has 2^6 on it.
- The first player who covers a horizontal, vertical, or diagonal straight line wins.

Sample Card:

1	4^3	8^7	3^3	9^6	8^5
2	5^2	2^3	5^5	4^2	9^4
3	3^6	2^4	free	3^4	2^6
4	6^2	2^2	5^3	7^2	2^5
5	7^4	2^6	6^5	6^3	8^2
	B	I	N	G	O

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 8

Student Learning Objective(s) A. The student knows $M^x.M^y=M^{x+y}$ $(3^2.3^4=3^6)$. B. The student knows $M^x÷M^y-M^{x-y}$ $(2^6÷2^4=2^2)$.

State Goal	1
District Goal	
Program Goal	3,7

Related Area(s)

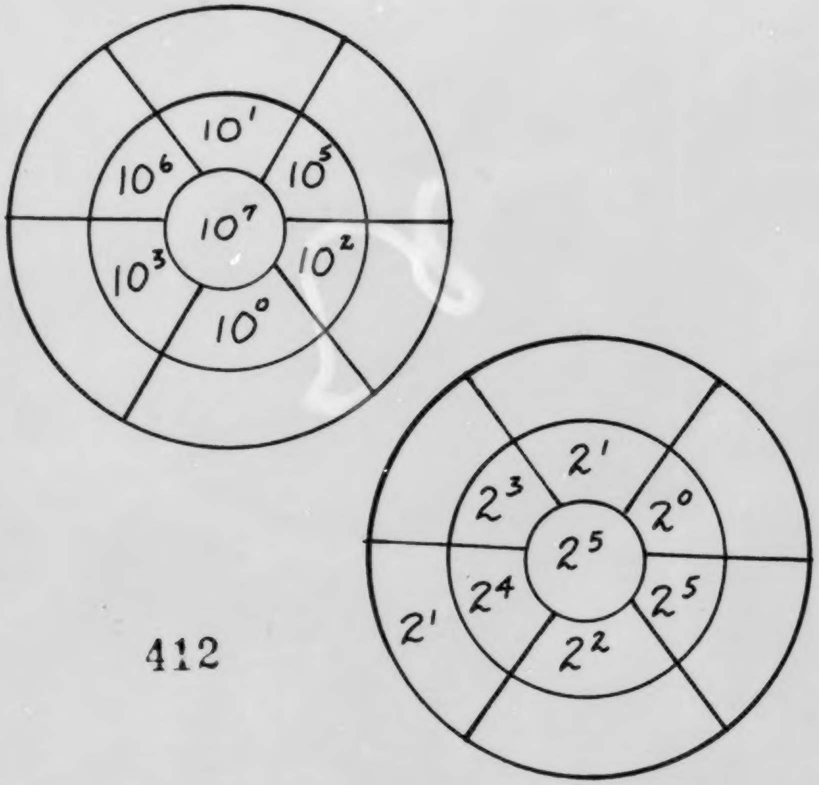
Suggested Activities: Grade(s) 8

Title: Division Wheels (Exponents)
Group Size: entire class
Materials: division wheels

Procedure(s):

- Complete each division wheel by expressing each quotient as a single digit.

Example:



Suggested Monitoring Procedures

Teacher observation. Group students having difficulty with the concept for reteaching.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 8

Student Learning Objective(s) A. The student knows $M^x . M^y = M^{x+y}$ $(3^2 . 3^4 = 3^6)$. B. The student knows $M^x \div M^y = M^{x-y}$ $(2^6 \div 2^4 = 2^2)$.

State Goal	1
District Goal	
Program Goal	3,7

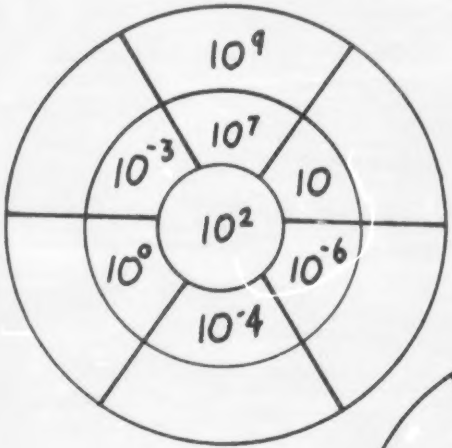
Related Area(s)

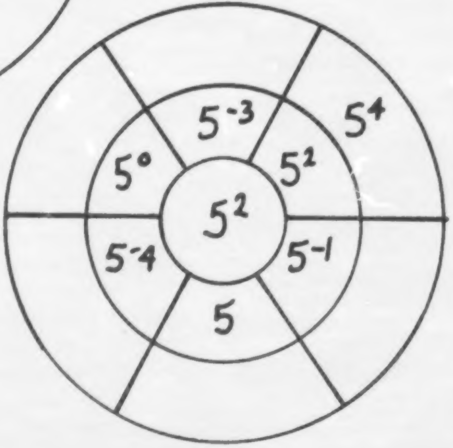
Suggested Activities: Grade(s) 8

Title: Multiplication Wheels (Exponents)
Group Size: entire class
Materials: multiplication wheels

Procedure(s):

- Complete each multiplication wheel by expressing each product as a single exponent.





Suggested Monitoring Procedures

Teacher observation. Group students having difficulty with the concept for reteaching.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

JECT: Mathematics

SPECIFIC AREA: Geometry: Shapes (Two-Dimensional)

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. a rectangle has four right angles (square corners, perpendicular lines) and opposite sides are congruent.		4-6					
. a square is a special rectangle with four equal (congruent) sides.		4-6					
. a parallelogram is a four sided figure with opposite sides equal.		4-6					
. a rectangle is a parallelogram with four right angles, or four 90° angles.	211	6-8					
. a parallelogram is a quadrilateral with opposite sides equal and parallel.	211	6-8					
. a quadrilateral is a four-sided polygon.		7-8					
. a trapezoid is a quadrilateral with one pair of parallel sides.		7-8					
. a rhombus is a parallelogram with four congruent sides.		8					
. a congruence means a point-to-point fit.	213	7-8					
. a polygon is a closed figure made up of straight line segments.	215	7-8					
The student is able to:							
*. identify two-dimensional figures: rectangle, parallelogram.		4-5					
. identify two-dimensional figures: quadrilateral, trapezoid, rhombus.		5-8					
identify and name congruent, two-dimensional shapes.	213	5-7					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________________

SMALL SCHOOL PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows a rectangle is a parallelogram with four right angles, or four 90° angles. B. The student knows a parallelogram is a quadrilateral with opposite sides equal and parallel.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,4

Suggested Activities: Grade(s) 7-8

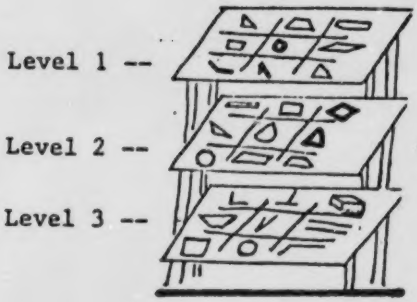
Title: Three-Dimensional Geo-Shape-O
Group Size: pairs
Materials: pencils, game cards

Procedure(s):

- Decide upon the shapes you want the students to identify. (There may be more than are given in the objectives above.)
- Draw a shape in each square of each level. Shapes can be used more than once.
- Prepare game cards by writing the name of each shape on a card. Cards can be reused until completion of the game.

Example:

Rhombus



423

Suggested Monitoring Procedures

Possible Resources

District Resources

424

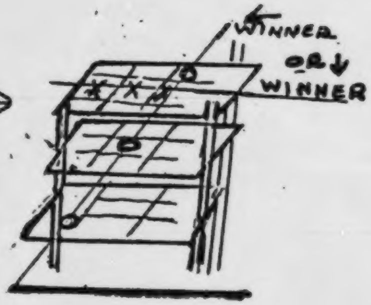
Suggested Activities: Grade(s) ______

Suggested Monitoring Procedures

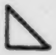
Possible Resources

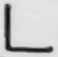
- Shuffle game cards and place cards upside down on the table.
- The game begins when a player turns the top card over. He/she may place his/her mark (X or O) on either of the three levels on the shape given on the game card. That card is returned to the bottom of the stack. Second player takes his/her turn. A winner is determined by a player getting three marks in a row (just as in Tic-Tac-Toe). Winner may get his/her marks in a row, but on different levels (on a straight line segment).

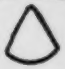
Example:

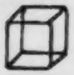


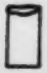
- Some words and shapes that can be used in the game are:

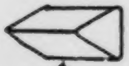
right triangle 

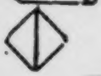
right angle 

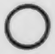
cone 

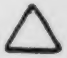
cube 

cylinder 

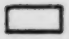
prism 

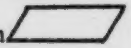
pyramid 

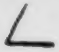
circle 

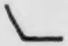
equilateral triangle 

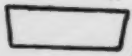
square

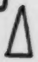
rectangle 

parallelogram 

acute angle 

obtuse angle 

trapezoid 

isosceles triangle 

rhombus

Variation:

Definitions of shapes may be put on cards instead of the names of the shapes.

District Resources

SMALL SCHOOL PROJECT - Working Copy

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student knows a congruence means a point-to-point fit.

B. The student is able to identify and name congruent, two-dimensional shapes.

State Goal	1, 4
District Goal	
Program Goal	2, 4

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Congruent Concentration
Group Size: two players
Materials: teacher-made cards of pairs of congruent shapes

Procedure(s):

- Cards are shuffled and placed face down, one by one, in neat rows.
- First player turns over any two cards he/she wishes.
- Player must then identify and name the congruent shape before he/she gets to keep the matched pair.
- If player does not make a match, his/her turn is over and the second player has a turn.
- The player with the most "matches" is the winner.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOL[illegible]ROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows a polygon is a closed figure made up of straight line segments.

State Goal 1

District Goal

Program Goal 2,4

Related Area(s) triangles, quadrilaterals

Suggested Activities: Grade(s) 7-8

Title: Straw Game
Group Size: small groups (two to four each)
Materials: plastic straws (cut to various lengths), pint container

Procedure(s):

- Each player in turn draws one straw form container.
- Player then lays straws on table to form triangles, quadrilaterals, rectangles or squares.
- Score points according to polygon formed. First student with a total of ten points wins.

	Points For Each
Triangle	1
Quadrilateral	2
Rectangle	3
Square	4

Title: Dot-to-Dot
Group Size: two students
Materials: colored pencils, crayons (students can make their own grids on notebook paper, or at the chalkboard)

Procedure(s):

- Mark out grid work of dots on paper or chalkboard.
- Students alternate turns at connecting dots to form squares. Each student uses a different color pencil or crayon.
- When a student forms a square, he/she puts his/her initial inside the square and gets one more move.

Suggested Monitoring Procedures

Possible Resources

District adopted text

District Resources

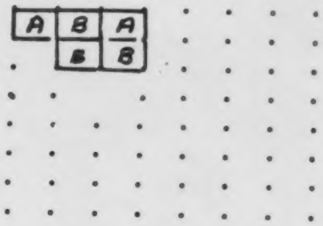
Suggested Activities: Grade(s) _______

Suggested Monitoring Procedures

Possible Resources

- Game ends when all squares are completed; winner is the one with the most squares.

Example:



433

District Resources

434

SUBJECT: Mathematics

SPECIFIC AREA: Geometry: Shapes (Three-Dimensional)

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. a die is a model of a cube.		4-6					
. a ball is a model of a sphere.		4-6					
. a can is a model of a cylinder.		4-6					
. the great pyramids of Egypt are models of a pyramid.		4-6					
. a sugar cone and a funnel without a spout are models of a cone.		4-6					
. a triangular prism is a three-dimensional figure with bases which are congruent triangles in parallel planes and lateral faces which are parallelograms.	219	7-8					
. a rectangular prism is a three-dimensional figure with bases which are congruent rectangles in parallel planes and lateral faces which are parallelograms.	219	7-8					
The student is able to:							
. identify three-dimensional figures: cube, sphere, pyramid, cone.		4-5					
. identify three-dimensional figures: cylinder, triangular prism, rectangular prism.	219	6-7					
The student values:							

435

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______________

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows a can is a model of a cylinder. B. The student knows a triangular prism is a three-dimensional figure with bases which are congruent triangles in parallel planes and lateral faces which are parallelograms. C. The student knows a rectangular prism is a three-dimensional figure with bases which are congruent rectangles in parallel planes and lateral faces which are parallelograms. D. The student is able to identify three-dimensional figures: cylinder, triangular prism, rectangular prism.

State Goal	1,4
District Goal	
Program Goal	1,2,4

Suggested Activities: Grade(s) 7-8

Suggested Monitoring Procedures

Possible Resources

Title:
Group Size: individual, entire class
Materials: cardboard, glue, scissors, models of cylinders, triangular prisms, rectangular prisms

Procedure(s):

- Have students pass around and touch models of cylinders, triangular prisms and rectangular prisms.
- Explain to students details of each model.
- Hand out cardboard, scissors and glue. Have students try to make models of cylinders, triangular prisms and rectangular prisms.
- Help students who need it.
- Display models made in room or school.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

JECT: Mathematics

SPECIFIC AREA: Geometry: Points, Lines, Line Segments

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. a point is an exact location in space.	221	4-8					
. a line segment is part of a line and has two endpoints.	223	4-8					
. a straight line is a set of infinite points on a plane having no endpoints.	223	4-8					
. intersecting lines are lines in the same plane that cross each other.	227	5-7					
. parallel lines are lines in the same plane which do not intersect.	227	5-7					
. perpendicular lines are two intersecting lines that form right angles.	227	5-7					
. a ray is a set of infinite points on a plane with one endpoint.	231	5-8					
. a plane is a set of points that can be connected with a line.		4-8					
The student is able to:							
. identify a point, a line, and a line segment.	223	4-5					
. identify a ray.	223	5-7					
. measure a line segment.		4-6					
. identify the following types of lines: intersecting, parallel, perpendicular.	227	5-7					
. bisect a line segment.	225	7-8					
. construct parallel and perpendicular lines.	229	7-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

443

444

SMALL SCHOOLS PROJECT

Suggested Objective Placement ____________

Student Learning Objective(s) A. The student knows a point is an exact location in space. B. The student knows a line segment is part of a line and has two endpoints. C. The student knows a straight line is a set of infinite points on a plane having no endpoints. D. The student is able to identify a point, a line, and a line segment. E. The student is able to identify a ray.

Related Area(s) ____________

State Goal	
District Goal	
Program Goal	

Suggested Activities: Grade(s) 7-8

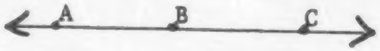
Title: Points, Lines, Line Segments and Rays

Group Size: entire class

Materials: overhead, chalkboard, worksheet

Procedure(s):

- Explain that a point is an idea, therefore it has no dimension, width, or thickness and cannot be seen. Put a dot on the overhead or chalkboard and suggest it will represent a point.
- Draw a line with arrows on each end and suggest that it is made up of an unlimited number of points, and goes on and on in both directions. A line is named by any two points in it, i.e.,



Thus it can be called line AB, line BC, line CB, line BA, or line CA.

- Suggest that a line segment has two endpoints, i.e., B, and is called $\overline{AB}$ or $\overline{BA}$.
- Draw a ray and explain that a ray has one endpoint, and extends forever in one direction, i.e., Ray $\overline{AB}$. It also is named with the endpoint first.
- Give students a worksheet and have them identify segments, rays, lines and points.

Suggested Monitoring Procedures

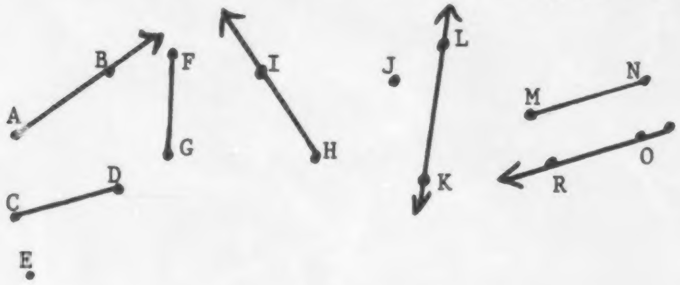
Possible Resources

District Resources

Suggested Activities: Grade(s) _______

Example:

1. Fill in the chart with the letter names of the following rays, lines, points and segments.



Line Segments	
Rays	
Lines	
Points	

2. Draw and name:
4 lines, 4 line segments, 4 rays, 1 point.

Suggested Monitoring Procedures

Possible Resources

District Resources

SMALL SCHOOL PROJECT

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows a line segment is part of a line and has two endpoints. B. The student is able to bisect a line segment.

State Goal	1
District Goal	
Program Goal	2,4,6

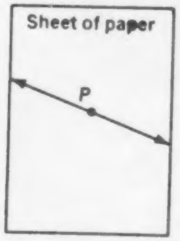
Related Area(s)

Suggested Activities: Grade(s) 7-8

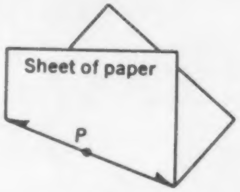
Title: Paper Fold Perpendiculars
Group Size: small group, entire class
Materials: paper, pencil

Procedure(s):

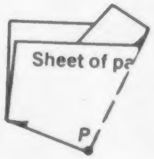
- Have students draw any line and locate a point (p) on it. (Step 1)
- Have students fold the paper back along the line. (Step 2)
- Have students fold the paper back along the dotted line at P so that the base edges match. (Step 3)
- Have students unfold the paper. The dotted line is perpendicular to the initial line at P.
- Note that the dotted line is not drawn, it is constructed by folding.



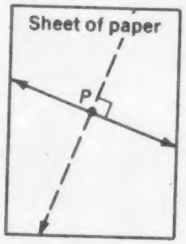
Step 1



Step 2



Step 3



Step 4

Suggested Monitoring Procedures

Teacher observation and assistance.

Possible Resources

District adopted text

Basic Mathematics, Deans, et al
American Book Co., San Francisco, 1977

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

451

452

SMALL SCHOOLS PROJECT

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student knows intersecting lines are lines in the same plane that cross each other. B. The student knows parallel lines are lines in the same plane which do not intersect. C. The student knows perpendicular lines are two intersecting lines that form right angles. D. The student is able to identify the following types of lines: intersecting, parallel, perpendicular.

State Goal	1
District Goal	
Program Goal	2,4,6

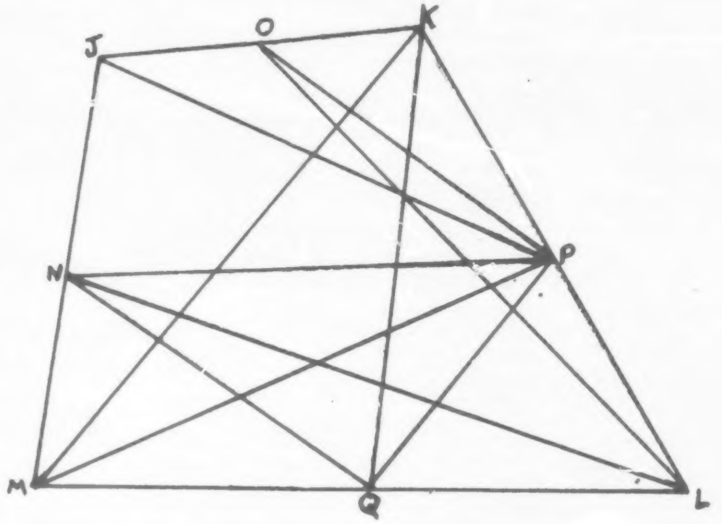
Related Area(s) __________

Suggested Activities: Grade(s) 7-8

Title: Identifying Line Segments
Group Size: small group, entire class
Materials: worksheet, pencil

Procedure(s):

- Have students identify all pairs of line segments that run parallel by naming the line segments.
- Have them identify all line segments that intersect and form right angles.



Suggested Monitoring Procedures

Peruse student worksheet and assist students having difficulty with the concept.

Possible Resources

Topic 61, Geometry Figures, Wisconsin Research and Development Center for Cognitive Learning, Rand McNally and Co.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student knows parallel lines are lines in the same plane which do not intersect. B. The student knows perpendicular lines are two intersecting lines that form right angles. C. The student is able to construct parallel and perpendicular lines.

State Goal	1
District Goal	
Program Goal	2,4,6

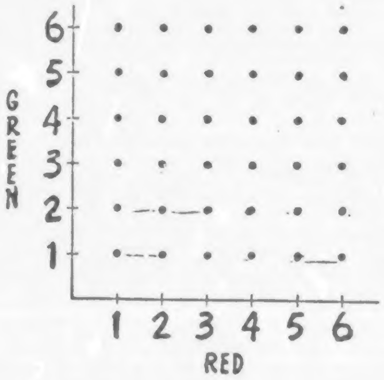
Related Area(s) ______

Suggested Activities: Grade(s) 7-8

Title: Parallel and Perpendicular Line Trace
Group Size: pairs
Materials: worksheet with directions, ruler

Procedure(s):

- The player throwing the highest total on the dice starts the game.
- The first player rolls four dice - two red, two green, from the four, he/she chooses one red, and one green---marking the point they represent.
- One player circles a point, the other "X"s his/hers.
- Once a point is covered, it belongs to that player.
- Four in a row wins---vertical, horizontal or diagonal.
- Have students connect the points to show examples of parallel and perpendicular lines.
- Have students label the parallel and perpendicular lines.



Suggested Monitoring Procedures

Give students a worksheet with parallel and perpendicular lines and have them label them.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student knows a ray is a set of infinite points on a plane with one endpoint. B. The student is able to identify a ray.

State Goal	1
District Goal	
Program Goal	2,4,6

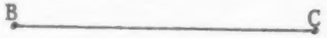
Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: A Ray
Group Size: entire class
Materials: overhead, chalkboard, worksheet

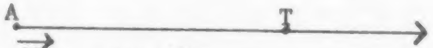
Procedure(s):

- Review with students the definition of a line segment: a line segment is part of a line. It has two endpoints. The endpoints can be used to name the line segment.



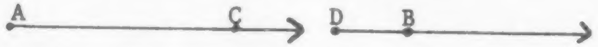
line segment $\overline{BC}$ or $\overline{CB}$

- Draw a line with one endpoint and point out that a ray is a part of a line with one endpoint and extends forever in one direction. To name a ray, name the endpoint first and then another point on the ray:



$\overrightarrow{AT}$ ray AT

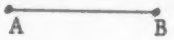
- Give students a worksheet with rays and ask them to identify the rays by letter:



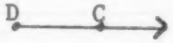
- Students should also be asked to describe the ray identified, i.e., ray with endpoint A and including point C.

Suggested Monitoring Procedures

Give students a worksheet with line segments and rays and ask them to identify both:



(line segment) $\overline{AB}$ $\overline{BA}$



ray $\overrightarrow{DC}$

Possible Resources

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

JECT: Mathematics

SPECIFIC AREA: Geometry: Angles, Triangles

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
Angles							
. an angle is the union of two rays with a common endpoint.	235	6-8					
. a right angle is 90°.	237	5-8					
. an acute angle is less than 90°.	237	5-8					
. an obtuse angle is more than 90°.	237	5-8					
. supplementary angles are two angles whose sum equals 180°.	241	7-8					
. complementary angles are two angles whose sum equals 90°.	241	7-8					
Triangles							
. a triangle is a polygon with three sides.		7-8					
. a triangle is a figure with three sides.		5-6					
. a right triangle has one right angle.	243	5-8					
. an acute triangle has three acute angles.	243	5-8					
. an obtuse triangle has one obtuse angle.	243	5-8					
. an equilateral triangle has three congruent sides.	243	5-8					
. an isosceles triangle has two congruent sides.	243	5-8					
. a scalene triangle has no congruent sides.	243	5-8					
The student is able to:							
. identify congruent angles.	235	7-8					
. measure angles to the nearest degree: right, obtuse, acute.	235	7-8					
* . identify triangles (by angles) right triangle, acute triangle, obtuse triangle.	243	5-8					
. identify triangles (by sides): isosceles triangle, scalene triangle, equilateral triangle.	243	5-8					
. bisect any angle.	239	8+					
. identify equal angles.		6					
The student values:							

405

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______________

SMALL SCHOO PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows an angle is the union of two rays with a common endpoint. B. The student is able to identify congruent angles. C. The student is able to measure angles to the nearest degree: right, obtuse, acute. (The student has learned to identify right, obtuse and acutes in another objective.)

Related Area(s)

State Goal	1,4
District Goal	
Program Goal	2,4

Suggested Activities: Grade(s) 7-8

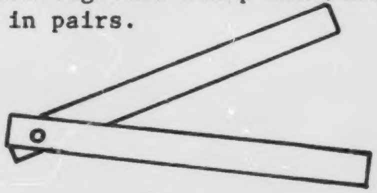
Title: What's Your Angle
Group Size: small groups (three each)
Materials: strips of tagboard, brass fasteners, protractors

Procedure(s):

- Illustrate on the chalkboard two intersecting rays with a common end point - identified as an angle to measure.
- Discuss and demonstrate how to read a protractor.
- Make angle sizers (directions below).
- Divide students into teams (three each).
- Teacher may act as referee at first, switching to students as they learn the game.

Directions for "What's Your Angle?"

- Make two angle sizers by punching a hole in the end of each tagboard strip and fastening them together in pairs.



- Play What's Your Angle? with three students.
- For each round of the game, one person will be the referee and the other two the players.
- The game is completed when three rounds have been played and each student has been the referee.
- The winner is the player with the greatest score.

To play a round:

- The referee gives a number of degrees between 0 and 180.

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

SEAMATH, Seattle Public Schools, Administration and Service Center, 4th North, Seattle, WA 98109.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
- Each player opens his/her angle sizer to show an angle of that size. - The referee uses a protractor to measure each angle. He/she determines if the angle formed with the angle sizer is congruent or equal to that shown on the protractor. - A point is scored by the player whose angle is nearest to the right size. - A round is completed after ten tries. The student with the most points after three rounds wins.		
		District Resources

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student knows a right angle is 90°. B. The student knows an acute angle is less than 90°. C. The student knows an obtuse angle is more than 90°. D. The student is able to measure angles to the nearest degree: right, obtuse, acute.

State Goal	1, 4
District Goal	
Program Goal	2, 4

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: The Do-It-Yourself Protractor
Group Size: entire class
Materials: file cards, two tagboard strips, one brass fastener, protractor, paper punch, pencil (for each student)

Procedure(s):

- Have each student construct a protractor and angle measure. (see back of page)
- Illustrate acute, 90°, and obtuse angles on chalkboard and demonstrate how to check with the do-it-yourself protractor.
- Have the students measure several examples of acute, right, and obtuse angles.

Title: Shapes
Group Size: entire class
Materials: old magazines, bulletin board, chart, scissors

Procedure(s):

- Teacher puts up bulletin board with the shapes right triangle, obtuse triangle, etc., outlined in heavy magic marker.
- Students cut objects out of old magazines that have the same shape as those outlined on the board.
- They then pin their pictures to the bulletin board and discuss the similarities.

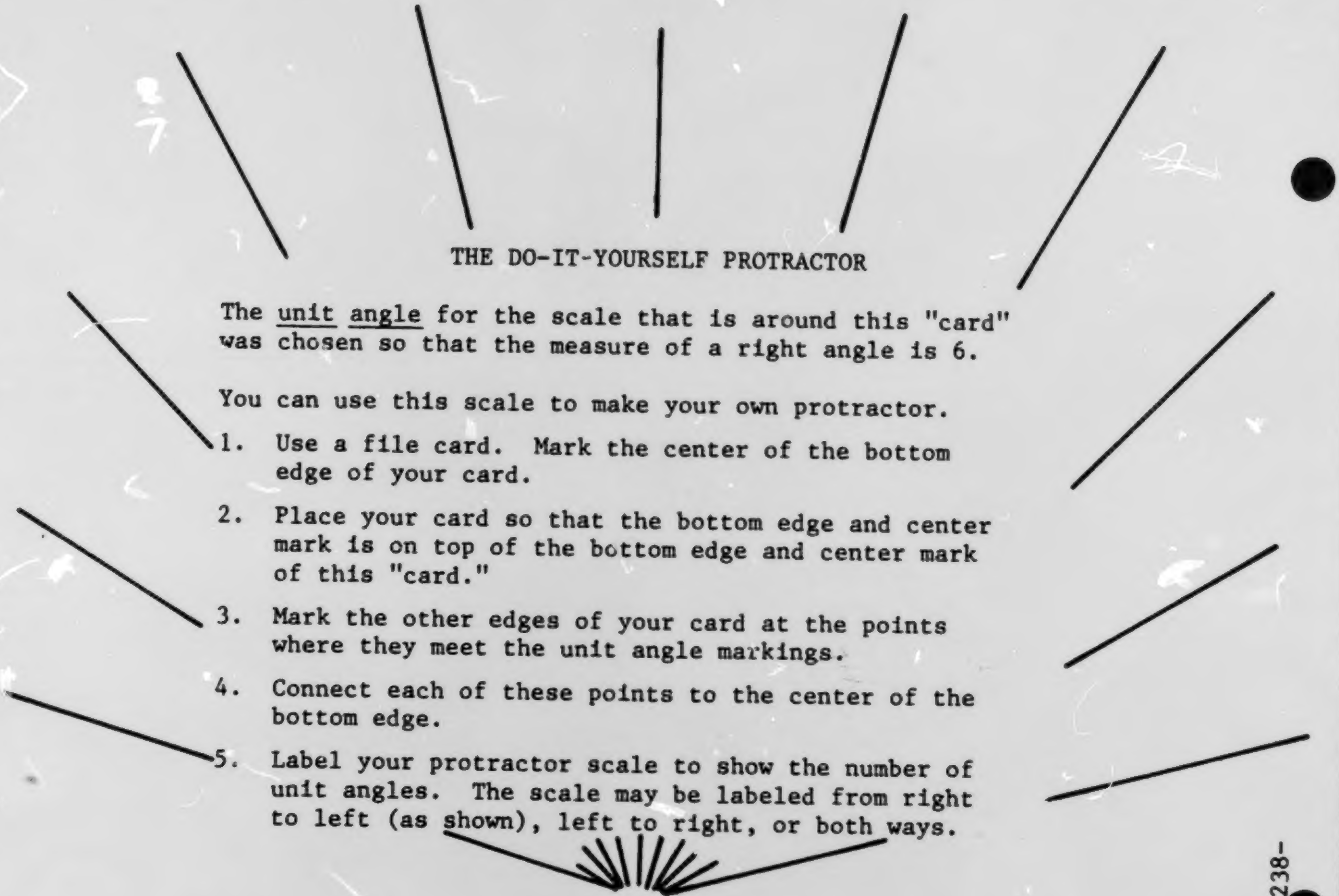
Variation:
Students can make a collage of the shapes and pictures.

Suggested Monitoring Procedures

Possible Resources

SEAMATH, Seattle Public Schools, Administrative and Service Center, 815 4th North, Seattle, WA 98109.

District Resources



THE DO-IT-YOURSELF PROTRACTOR

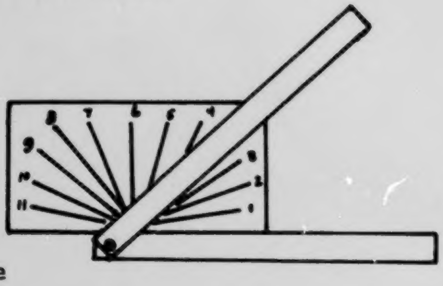
The unit angle for the scale that is around this "card" was chosen so that the measure of a right angle is 6.

You can use this scale to make your own protractor.

1. Use a file card. Mark the center of the bottom edge of your card.
2. Place your card so that the bottom edge and center mark is on top of the bottom edge and center mark of this "card."
3. Mark the other edges of your card at the points where they meet the unit angle markings.
4. Connect each of these points to the center of the bottom edge.
5. Label your protractor scale to show the number of unit angles. The scale may be labeled from right to left (as shown), left to right, or both ways.

Materials: two tagboard strips; brass fastener; paper punch; the "Do-it-Yourself" protractor.

1. Punch a small hole in one end of each strip. Attach them to each other with the fastener.
2. Spread the strips apart to make a right angle.
   Make angles that are larger than a right angle.
   Make angles that are smaller than right angles.



3. Make an angle that is larger than a right angle.
   Estimate the measure of the angle in your protractor units.
   Use your protractor to check the estimate.
4. Make other angles. Estimate and then measure in each case.

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Suggested Objective Placement 6-8+

Student Learning Objective(s) A. The student knows an angle is the union of two rays with a common endpoint. B. The student is able to bisect any angle.

State Goal	1
District Goal	
Program Goal	2,4,7

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Angles and Rays
Group Size: individual, entire class
Materials: compass, straightedge, colored pencils

Procedure(s):

- Time each student for the following activity. Put times on chalkboard. The fastest time is the winner.
- Have students draw any four sided figure.
- Have students pick any two angles of the above figure and label one angle (1) and the other angle (2).
- Have students color the common end point: of angle (1) BLUE; of angle (2) GREEN.
- Have the students color the two rays: of angle (1) RED; of angle (2) BLACK.
- Have the students bisect: angle (1); angle (2).

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources

District Resources

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows supplementary angles are two angles whose sum equals 180°. B. The student knows complementary angles are two angles whose sum equals 90°.

State Goal	1
District Goal	
Program Goal	2, 4

Related Area(s)

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
		District adopted text.

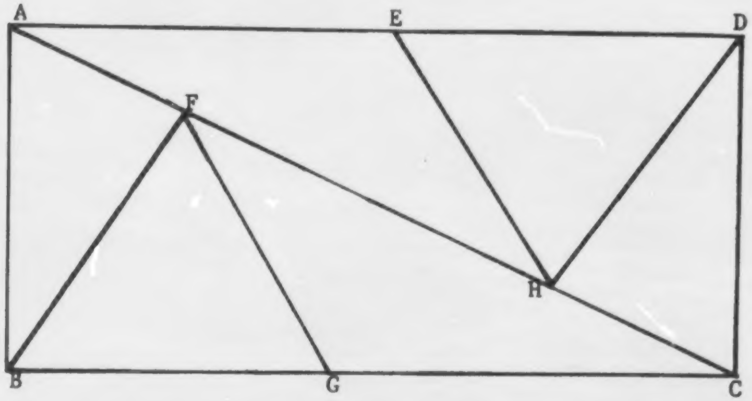
Title: Find the Supplementary and Complementary Angles

Group Size: entire class

Materials: worksheet of figure containing supplementary and complementary angles, ruler, protractor

Procedure(s):

- Give each student a copy of drawing (below).
- Have students find as many supplementary and complementary angles as they can.
- Use ruler to check supplementary angles.
- Use protractor to check complementary angles.
- After naming angles, cut out pieces and fit together to check.



District Resources

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Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student knows a right triangle has one right angle. B. The student knows an acute triangle has three acute angles. C. The student knows an obtuse triangle has one obtuse angle. D. The student is able to identify triangles (by angles) right triangle, acute triangle, obtuse triangle .

Related Area(s)

State Goal	1, 4
District Goal	
Program Goal	2, 4

Suggested Activities: Grade(s) 7-8

Title: Tallyangle
Group Size: pairs
Materials: paper, pencil, ruler, protractor, small triangles of assorted shapes (right, acute, obtuse), one pint container

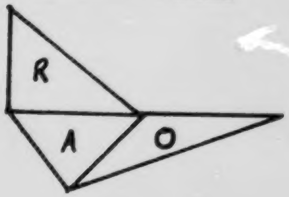
Procedure(s):

- Put the triangles into a container.
- Students, without looking at each other's triangles, choose three triangles from container.
- Students place the three triangles on paper to make a shape. Direct the students to put sides next to each other that are the same length.
- Students then carefully trace around each shape with a pencil.
- Each student carefully cuts out his/her shape.
- Students compare shape to chart to see how many points they have. The person with the most points wins.

Example:

Chart	Point
Shape with largest angle	3
Shape with smallest angle	2
Any right angle	1
Any obtuse angle	1
Shape with most corners	1

Sample Shape
R - Right Triangle
A - Acute Triangle
O - Obtuse Triangle



Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) ______

Suggested Monitoring Procedures

Possible Resources

Title: Know Your Angles and Triangles - "Concentration"

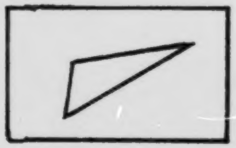
Group Size: small groups

Materials: two sets of game cards

Procedure(s):

- Prepare two sets of game cards. One set has definitions and the other has illustrations of different kinds of triangles, i.e., equilateral, isosceles, scalene. All cards are numbered on the back.

Example:



Obtuse
triangle

1 obtuse angle

- Students lay cards face down (numbers up) on the desk and play "Concentration" by matching definitions and illustrations.
- The students with the most sets of cards - wins.

Title: Shapes

Group Size: entire class

Materials: old magazines, bulletin board, chart, scissors

Procedure(s):

- Teacher puts up a bulletin board with the shapes (right triangle, obtuse triangle, etc.) outlined in heavy magic marker.
- Students cut objects out of old magazines that have the same shape as those outlined on the board.
- They then pin their pictures to the bulletin board and discuss the similarities.

Variation:

Students can make a collage of the shapes and pictures.

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District Resources

486

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Suggested Objective Placement 5-8

Student Learning Objective(s) A. The student knows an equilateral triangle has three congruent sides. B. The student knows isosceles triangle has two congruent sides. C. The student knows a scalene triangle has no congruent sides. D. The student is able to identify triangles (by sides): isosceles triangle, scalene triangle, equilateral triangle.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Know Your Triangles — "Concentration"

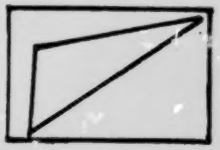
Group Size: pairs

Materials: two sets of game cards

Procedure(s):

- Prepare two sets of game cards. One set has definitions and the other has illustration of different kinds of triangles, i.e., equilateral, isosceles, scalene. All cards are numbered on the back.

Example:



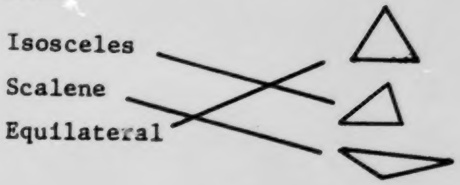
Scalene triangle no congruent sides

- Students lay cards face down (numbers up) on the desk and play "Concentration" by matching definitions and illustrations.
- The student with the most sets of cards wins.

Variation(s):

- On a worksheet, have students match names of triangles with illustrations of triangles.

Example:



Suggested Monitoring Procedures

Possible Resources

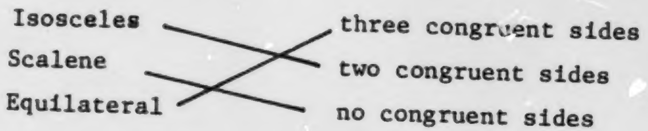
District adopted text.

District Resources

Suggested Activities: Grade(s) ______

- Also have students match definitions of triangles and names of triangles.

Example:


Isosceles
Scalene
Equilateral
three congruent sides
two congruent sides
no congruent sides

Suggested Monitoring Procedures

Possible Resources

District Resources

SUBJECT: Mathematics

SPECIFIC AREA: Geometry: Circles

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. a circle is the set of all points in the same plane equal distance from a given point.		4-6					
. the circumference of a circle is the same as the perimeter of a circle.	249	6-8					
. a cord is a straight line within a circle whose endpoints touch the circumference.	249	8					
. the diameter of a circle is a line segment going through the center of a circle whose endpoints touch the circumference.		4-6					
. the radius is a line segment within a circle, one endpoint at the center and the other endpoint on the circumference.		4-6					
. an arc is a portion of the circumference of a circle.	249	6-8					
The student is able to:							
* . locate properties of a circle: diameter, radius, center.	249	4-6					
* . locate properties of a circle: cord, arc, semicircle.		6-8					
* . construct a circle from a given radius or diameter.		6-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION 492	ENVIRONMENTAL EDUCATION	OTHER ______________ 493

SMALL SCHO[illegible] PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows the circumference of a circle is the same as the perimeter of a circle. B. The student knows a cord is a straight line within a circle whose end-points touch the circumference. C. The student knows an arc is a portion of the circumference of a

Related Area(s) circle. D. The student is able to locate properties of a circle: cord, arc, semicircle.

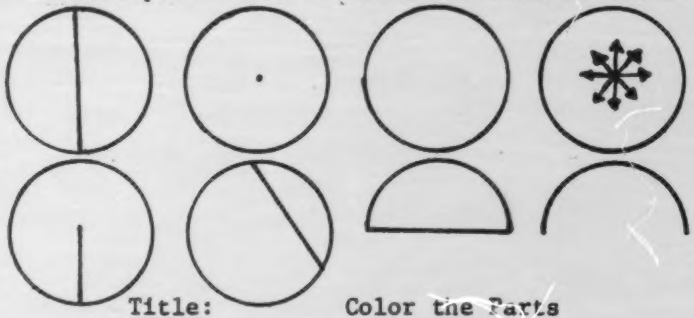
State Goal	1
District Goal	
Program Goal	2,4,8

Suggested Activities: Grade(s) 7-8

Title: Circle Rummy
Group Size: two to three
Materials: deck of cards (see illustration) four of each type.

Procedure(s):

- Student shuffles cards and deals five cards to each player (except person who starts game, he/she gets six). He/she discards one card.
- Object is to get books of three or four.
- Next person either takes discards or draws.



Title: Color the Parts
Group Size: entire class
Materials: worksheet with several examples of circumference, cords, arcs, diameters, radius, and circles on the one worksheet, crayons

Procedure(s):

- Students are asked, either by the teacher to the whole class, or by a job card, to color the: cords of a circle green, arcs red, circumferences purple, etc. Since there are several examples on each worksheet, colors will be used more than once.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

496

497

JECT: Mathematics

SPECIFIC AREA: Geometry: Perimeter

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. the perimeter of polygons is determined by adding together the lengths of all sides.	253	4-6					
. the circumference of a circle is found by multiplying the diameter times pi ($C = \pi d$ or $C = 2r \cdot \pi$).	257	7-8					
. a polygon is a closed figure made up of straight line segments.	255	7-8					
. pi is the relationship between the circumference and the diameter of a circle, or approximately 3.1416.	259	7-8					
The student is able to:							
*. determine the perimeter of polygons.	253	4-8					
. determine the circumference of a circle, given the diameter or radius.	259	7-8					
determine the diameter or radius given the circumference.	257	7-8					
. determine the missing sides of a polygon, given the other sides and the perimeter.	255	7-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION 499	ENVIRONMENTAL EDUCATION	OTHER ____________ 500

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows the perimeter of polygons is determined by adding together the lengths of all sides. B. The student is able to determine the perimeter of polygons.

State Goal	1
District Goal	
Program Goal	2,4,6

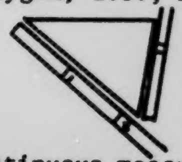
Related Area(s)

Suggested Activities: Grade(s) 7-8

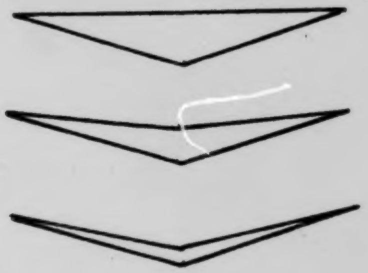
Title:
Group Size: entire class
Materials: rulers, worksheet of polygons

Procedure(s):

- Have students use rulers to add up the distance around the polygon, i.e., measure continuously on the ruler.



- Relate the continuous measurement by adding up the sides of the polygons to get the distance around or perimeter.
- Practice finding the perimeter of the remaining polygons on the worksheet.
- Have students compare the perimeter of the following types of polygons:



Suggested Monitoring Procedures

Teacher observation.
Worksheet of polygons with students finding the perimeter when given the length of all the sides.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7-8

Title: Demonstration
Group Size: entire class
Materials: colored chalk, string, chalkboard

Procedure(s):

- Draw a polygon on the chalkboard using a different color for each lateral.
- Ask different students to come up and cut a piece of string the same length as the blue line, red line, etc.
- Ask how much string was used. Students hold up their cut pieces in a line.
- Together write the number sentence on the board, i.e., blue line + red line, etc. = distance around the figure or perimeter.
- Then write in numbers on the laterals. Again write the number sentence.
- Draw other polygons with measurements. Ask volunteers to come to the chalkboard to determine perimeter.

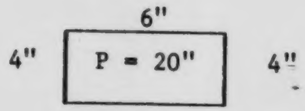
Title: What's the Perimeter?
Group Size: entire class
Materials: geoboards, rubber bands

Procedure(s):

- Pair up students, each pair having a geoboard and rubber bands.
- One of the pairs designs a shape on the geoboard. The other student works out the perimeter of the shape.

Suggested Monitoring Procedures

Give the students a worksheet with drawings of polygons showing the length of each side and have them compute the perimeter.
The first problem could be a polygon showing the length of three sides and the perimeter with the students uniting the lengths for determining the perimeter of a polygon, i.e.



Teacher observation.

Possible Resources

District adopted text.

District adopted text.

District Resources

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Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student knows the perimeter of polygons is determined by adding together the lengths of all sides. B. The student knows a polygon is a closed figure made up of straight line segments. C. The student is able to determine the missing sides of a polygon, given

Related Area(s) the other sides and the perimeter.

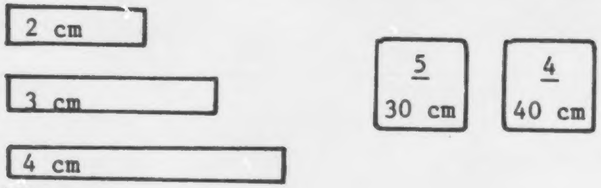
State Goal	1
District Goal	
Program Goal	2,4,6

Suggested Activities: Grade(s) 7

Title: Missing Side

Group Size: individual, small group

Materials: small strips of paper of various lengths with length written on the strip, cards giving number of sides and perimeter of desired figure.



Procedure(s):

- Have students draw a card at random.
- Have students draw at random a number of strips equal to one less than the number of sides for the given figure, i.e., three sides, draw two; five sides, draw four.
- Have students lay out figure using one strip for each side and determine the length of the remaining side.
- NOTE: If given perimeter is impossible, draw additional strips and combine with another to form longer side.

Suggested Monitoring Procedures

Assist students to identify impossible perimeters, i.e., if given perimeter is greater than or equal to twice the sum of lengths of the sides drawn.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SC[illegible]LS PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the circumference of a circle is found by multiplying the diameter times pi ($C = \pi \cdot d$ or $C = 2r \cdot \pi$). B. The student is able to determine the diameter or radius given the circumference.

State Goal	1
District Goal	
Program Goal	2,4,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title:	Measuring Wheel
Group Size:	entire class
Materials:	three inch plastic lids attached to one foot piece of lath at center of lid, i.e.,

Procedure(s):

- Have the students place a mark on the edge of the lid.
- Have students carefully roll the lid one revolution and measure the distance covered. (This should equal the circumference of the lid).
- Have the students divide this distance by three (diameter of lid). The answer should come out 3.1 or very close to it which is the approximate value of π.
- Have the students reverse the operation. (Students will find $\pi \cdot d = C$).

Variation

- For variety or extension of the activity, use a 26" bicycle tire attached to a bike fork, compute circumference of the tire in classroom, then have the students use tire as measuring wheel to measure the school parking lot, football field, etc.

Suggested Monitoring Procedures

Worksheet of problems with the student given the circumference of a circle and asked to find the radius; asked to find the diameter.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

511

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Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the circumference of a circle is found by multiplying the diameter times pi (C= $\pi \cdot d$ or $C = 2$). B. The student knows pi is the relationship between the circumference and the diameter of a circle, or approximately 3.1416. C. The student is

Related Area(s) able to determine the circumference of a circle, given the diameter or radius.

State Goal	1
District Goal	
Program Goal	2,4,6

Suggested Activities: Grade(s) 7

Title: Marty Math Makes a Pi
Group Size: pairs
Materials: cylinders (cans) of various diameters, string and ruler (or cloth tape measure), pencil, paper

Procedure(s):

- In each pair, one student is to measure and one is to record.
- Have students measure the diameter of a can.
- Have students measure circumference with tape measure, string and ruler, or by rolling cylinder on flat surface exactly one turn.
- Have students divide circumference by diameter.
- Have students repeat with several cylinders.
- Compare results of divisions.
- NOTE: Students have found approximate value of pi.
- Have students measure diameter of can and predict the approximate circumference, then measure to test prediction.

Suggested Monitoring Procedures

Worksheet of problems with the student determining the circumference of a circle given the diameter; when given the radius.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

515

516

SUBJECT: Mathematics

SPECIFIC AREA: Geometry: Area: rectangles, triangles, circles

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. area is a two-dimensional surface.	263	6-8					
. area is measured in square units.	263	6-8					
. a square unit is represented by unit^2 (cm^2, dm^2).	263	6-8					
. the area of a rectangle is determined by multiplying the length times width ($A = lw$).	263	6-8					
. the area of a parallelogram is determined by multiplying the base times the height ($A = bh$).	273	6-8					
. the area of a triangle is determined by multiplying one-half the base times the height ($A = \frac{1}{2}bh$).	273	6-8					
. the area of a circle is determined by multiplying pi times radius squared ($A = \pi r^2$).	277	7-8					
The student is able to:							
* . compute the area of a rectangle given the length and width.	269	6-8					
. compute either the length or width of a rectangle given the area and one dimension.	263	7-8					
. compute the area of a parallelogram given the base and height.		6-8					
* . compute the area of a triangle given the base and height.	273	6-8					
. compute the height or base given the area and one dimension.		7-8					
* . compute the area of a circle given either the diameter or radius.		7-8					
. compute the radius or diameter of a circle given the area.	277	7-8					
The student values:							

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OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREIR EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______________

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Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows area is a two-dimensional surface. B. The student knows area is measured in square units. C. The student knows a square unit is represented by unit^2 (cm^2, dm^2). D. The student knows the area of a rectangle is determined by multiplying the length times width (A = lw). E. The student is able to compute either the length or width of a rectangle given the area and one dimension.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,4

Suggested Activities: Grade(s) 7-8

Title: Demonstration: What is Area?
Group Size: entire class
Materials: piece of string twenty inches long, cloth large enough to cover a student desk

Procedure(s):

- Give a student the piece of string and ask the student to cover his/her desk with it. Ask the student why the string won't do the job. (String only covers one dimension, linear measurement, or length).
- Then give the student the cloth to cover the desk. Discuss the second dimension. (The cloth has two dimension, length and width; therefore, the surface is covered by these two dimensions.

Suggested Monitoring Procedures

Observe students during demonstration and note students having difficulty with the concept being presented.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

522

523

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

State Goal	1
District Goal	
Program Goal	2,4,6

Student Learning Objective(s) A. The student knows area is measured in square units. B. The student knows a square unit is represented by unit^2 (cm^2, dm^2). C. The student knows the area of a rectangle is determined by multiplying the length times width ($A = lw$). D. The student is able to compute either the length or width of a rectangle given the area and one dimension.

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Area, Area

Group Size: individual, small group, entire class

Materials: scissors, pencil, paste, graph paper (preferably two contrasting colors)

Procedure(s):

- Student receives a polygon drawn on graph paper.
- Also he/she receives a rectangle or square which has the same area as the polygon.
- Have the student calculate the area of the rectangle. Then cut the polygon on the lines into rectangles and squares. Fit and paste the pieces into the rectangle.
- Have the student calculate the area of each piece and sum the areas, showing the total area is equal to the sum of the partial areas.
- See diagrams on back of page.

Suggested Monitoring Procedures

Observation of students in the activity.

Give the students a worksheet with several problems on finding the area of a rectangle when given the length and width.

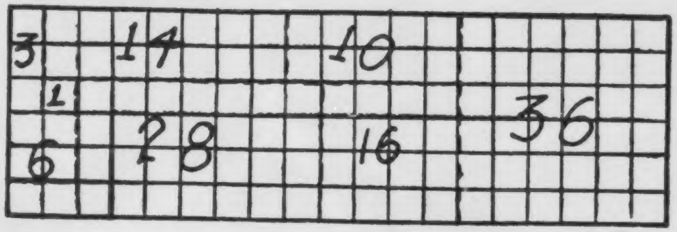
Vary the problems by having students solve problems when only the area and the length is given (find the width) or when the area and the width is given (find the length).

Possible Resources

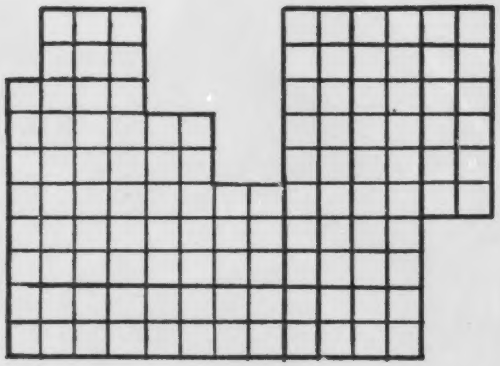
District adopted text.

District Resources

Suggested Activities: Grade(s) 7-8



Rectangle of an area of 114 square units.



Polygon with area of 114 square units.

Variation:

- Start with rectangle and cut and paste to form a house plan, labeling rooms and area of each.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows area is measured in square units. B. The student knows a square unit is represented by unit^2 (cm^2, dm^2). C. The student knows the area of a rectangle is determined by multiplying the length times width (A = lw). D. The student is able to compute the area of a rectangle given the length and width.

Related Area(s)

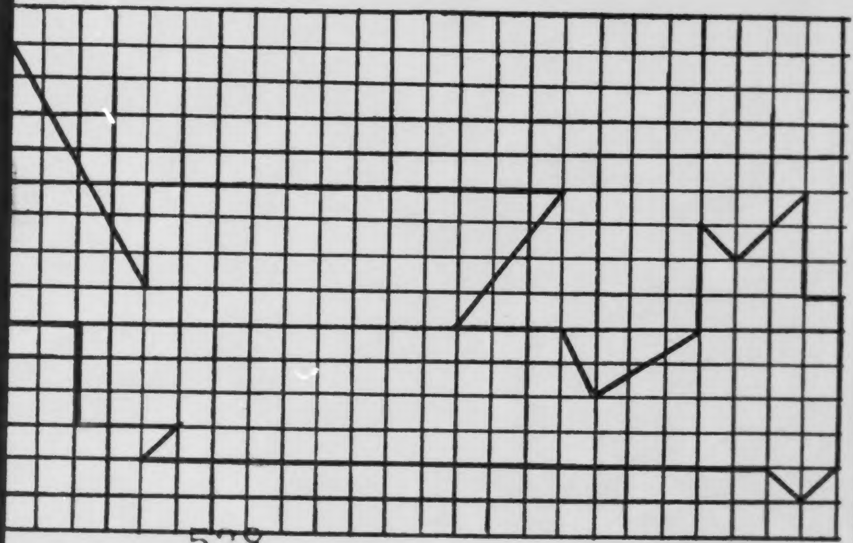
State Goal	1
District Goal	
Program Goal	2,4,6

Suggested Activities: Grade(s) 7-8

Title: Area of "Whatsit"?
Group Size: entire class
Materials: graph paper, straightedge

Procedure(s):

- Each student draws a closed figure (Whatsit) on his/her graph paper using a straightedge. The figure must be:
  - drawn on the lines of the graph paper.
  - drawn from the corner of one square on the grid to the corner of another square (making a diagonal line) See illustration.
  - all straight lines, no curves!
- Students may then trade drawings and compute the area of the figure. (Student must compute area for both rectangles and triangles.)



Suggested Monitoring Procedures

Give students a worksheet with rectangles showing the length and width and have them compute the area.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

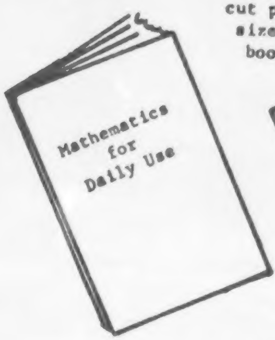
Student Learning Objective(s) A. The student knows area is measured in square units. B. The student knows a square unit is represented by unit^2 (cm^2, dm^2). C. The student knows the area of a rectangle is determined by multiplying the length times width (A = lw). D. The student is able to compute the area of a rectangle given the length and width.

Related Area(s)

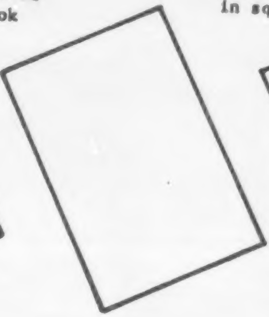
State Goal	1
District Goal	
Program Goal	2,4,6

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
Title: Paint the Room **Group Size:** entire class **Materials:** tape measures, label from paint can **Procedure(s):** . Divide the class into four groups; assign a wall of classroom to each group. Have each group compute the area of the painted surface on the assigned wall. . Have the students read the paint can label to decide how much paint would be required to repaint the assigned wall. . Have the groups check each other for accuracy.	Monitor the groups noting those having difficulty with the problem. Use a worksheet with problems on area of a rectangle. Vary the worksheet by using different rectangular shapes.	District adopted text.
		District Resources
Title: Area = Square Units as Unit^2 **Group Size:** entire class **Materials:** a specific student text, a piece of paper cut to fit the surface of the student text **Procedure(s):** . Have the student divide the cut paper into squares. . Ask the student to count the squares in order to find the area. Area is measured in square units. . Point out that there are the same number of squares or units in each row; therefore, a more efficient way to count units is to multiply the two dimensions. Area = L x W square units, or Area = L x W unit^2	Observe students, noting those who master the concept easily and those having difficulty.	District adopted text.

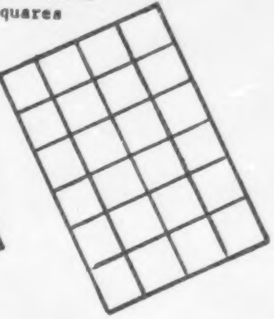
Suggested Activities: Grade(s) ______


Mathematics
for
Daily Use

cut paper
size of
book



paper divided
in squares



Suggested Monitoring
Procedures

Possible Resources

District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows area is measured in square units. B. The student knows a square unit is represented by unit^2 (cm^2, dm^2). C. The student knows the area of a rectangle is determined by multiplying the length times width ($A = lw$). D. The student is able to compute either the length or width of a rectangle given the area and one dimension.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,4,6

Suggested Activities: Grade(s) 7-8

Title: Geoboard Area
Group Size: entire class
Materials: geoboards for one-half of the class, rubber bands

Procedure(s):

- Have students work in pairs. Give each pair a geoboard and rubber bands.
- One of the pairs sets up a rectangle on the geoboard for the other two to solve for area.
- Members of the pair alternate working with the geoboard.
- Students may also give problems:
  i.e., Area is 24 cm^2 and length is 6 cm; find the width.
  Area is 24 cm^2 and width is 4 cm; find the length.

Suggested Monitoring Procedures

Teacher observation during activity.

Worksheet with problems to solve involving the area of a rectangle.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows area is measured in square units. B. The student knows a square unit is represented by $unit^2$ (cm^2, dm^2). C. The student knows the area of a triangle is determined by multiplying one half the base times the height ($A=\frac{1}{2}bh$). D. The student knows the area of a parallelogram is determined by multiplying the base times the height ($A = bh$). E. The student is able to compute the area of a triangle given the base and height.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,4,6

Suggested Activities: Grade(s) 7-8

Title: Triangles and Parallelograms Compared

Group Size: individual, small group, entire class

Materials: rectangle cut from construction paper, parallelogram(s) cut from construction paper, scissors, ruler, pencil

Procedure(s):

- Have the students measure length and width of rectangle and calculate area of the rectangle ($A = lw$).
- Have students draw a diagonal; then have them carefully cut on diagonal.
- Have the students observe the shapes of the resulting figures and compare the two triangles. Ask students if the triangles are the same size.
- Ask students to compare the area of one triangle to the area of the rectangle.
- Have students repeat this process with parallelograms ($A = bh$).
- Ask students if a formula can be derived for the area of the triangle. ($A = \frac{1}{2}bh$)

Suggested Monitoring Procedures

Observation of students during the activity.

Give students a worksheet with figures of triangles and parallelograms. Have them indicate the formula to use when finding the area of each one. Have them compute the area using the formula they chose.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the area of a circle is determined by multiplying pi times radius squared ($A = \pi r^2$). B. The student is able to compute the area of a circle given either the diameter or radius.

State Goal	1
District Goal	
Program Goal	2,4,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

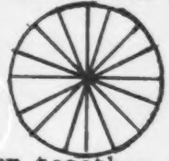
Title: Area of a Circle by Visual Aid

Group Size: individual, small group, entire class

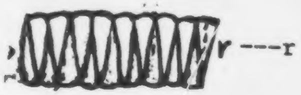
Materials: circle of given radius as shown below, scissors, worksheet

Procedure(s):

- Review radius (r), circumference (c), area of parallelogram ($A = bh$), $\approx$ means one number is approximately equal to another.
- Have students cut out parts of the circle.



and put them together as a parallelogram.



1/2xc

- Explain:

Area of parallelogram $= b \times h$ since $h \approx r$

$= b \times r$ since $b \approx \frac{1}{2}c$

$= \frac{1}{2} \times c \times r$ since $c = 2\pi r$

$= \frac{1}{2} \times 2 \times \pi \ r \times r$

$= 1 \times \pi \times r \times r$

$= \pi r^2$ since area of parallelogram = area of circle

Suggested Monitoring Procedures

Observation of the activity.

Check worksheets and group students needing additional help.

Possible Resources

District adopted text.

ESD 189 film F1627 "Developing the General Equation of a Circle"

District Resources

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
Area of circle = $//r^2$. Have students do number of problems involving finding the area of a circle given the radius or diameter (worksheet).		
		District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the area of a circle is determined by multiplying pi times radius squared ($A = \pi r^2$). B. The student is able to compute the radius or diameter of a circle given the area.

State Goal	1
District Goal	
Program Goal	2,4,6

Related Area(s)

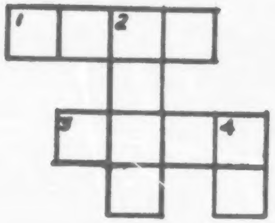
Suggested Activities: Grade(s) 7-8

Title: Circle the Area
Group Size: individual, entire class
Materials: worksheets (crossword puzzles to be made by teacher)

Procedure(s):

- Review formula $A = \pi r^2$; finding square roots. Use $3.14 = \pi$
- Explain process of finding the radius or diameter from the area of circle.
- Have two or three students do problems on the board.
- Have students do worksheets (crossword puzzles).
- Post the best worksheets on the bulletin board.

Example:



ACROSS:
1. Find the area of a circle whose r = 4 cm.
3. Find the area of a circle whose r = 3 cm.

DOWN:
2. Find the area of a circle whose r = 2.
4. Find the radius of a circle whose area is 11,304 square units.

Suggested Monitoring Procedures

Check crossword puzzles.

Give students a worksheet with several problems on finding the area of a circle and some on computing the radius or diameter of a circle when given the area.

Possible Resources

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Mathematics

SPECIFIC AREA: Geometry: Volume

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. the volume of a rectangular prism is determined by multiplying the length times height times width ($V=lhw$).	281	7-8					
. the volume of a cube is determined by multiplying side (edge) times side times side ($V= s . s . s$).	285	7-8					
. the volume of a cylinder is determined by multiplying pi (π) times radius squared times height ($V= \pi r^2h$).	287	7-8					
. a cubic unit shall be represented by unit^3 (cm^3, m^3, dm^3).	281	7-8					
The student is able to:							
*. determine the volume of a rectangular prism given the length, height and width.	281	7-8					
. determine the length, height or width of a rectangular prism given the volume and two of the three dimensions.	281	7-8					
*. determine the volume of a cube given the length of one side.	285	7-8					
. determine the length of a cube side given the volume.	285	7-8					
*. determine the volume of a cylinder given the radius (or diameter) and height.	287	7-8					
. determine the radius, diameter or height of a cylinder given the volume and one dimension.	289	7-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________________

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the volume of a rectangular prism is determined by multiplying the length times height times width (V=lhw). B. The student knows a cubic unit shall be represented by unit^3 (cm^3, m^3, dm^3). C. The student is able to determine the volume of a rectangular prism given the length, height and width. D. The student is able to determine the length, height or width of a rectangular prism given the volume and two of the three dimensions.

State Goal	1
District Goal	
Program Goal	2,4

Suggested Activities: Grade(s) 7-8

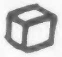
Title: Dimensions of Rectangular Solids

Group Size: small group

Materials: sugar cubes (or wooden cubes)

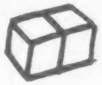
Procedure(s):

- Select one cube and record dimensions of rectangular solid formed by one cube.



= $1 \times 1 \times 1 = 1$ unit^3

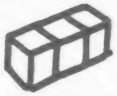
- Select another



= $1 \times 2 \times 1 = 2$ unit^3

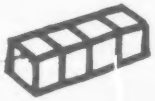
- Another

= $1 \times 3 \times 1 = 3$ unit^3

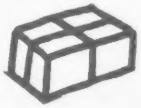


- Another

= $1 \times 4 \times 1 = 4$ unit^3



and



$2 \times 2 \times 1 = 4$ unit^3

Suggested Monitoring Procedures

Teacher observation.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources

- Continue in like fashion through any given number of cubes.
- Possibilities:

Cubes	Number of Rectangular Solids
1	1
2	1
3	1
4	2
5	1
6	2
7	1
8	3
9	2
10	2
11	1
12	3
13	1
14	2
15	3
16	3
17	1
18	4
19	1
20	4
etc.	

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the volume of a rectangular prism is determined by multiplying the length times height times width. (V=lhw). B. The student knows a cubic unit shall be represented by unit^3 (cm^3, m^3, dm^3). C. The student is able to determine the volume of a rectangular prism given the length, height, and width. D. The student is able to determine the length, height, or width of a rectangular prism given the volume and two of the three dimensions.

State Goal	1
District Goal	
Program Goal	2,4

Suggested Activities: Grade(s) 7-8

Title: Discovering a Formula for Volume

Group Size: small group

Materials:
- 6" x 4" x 2" box constructed from tagboard or chipboard
- let 2" represent the height
- 1" wooden cubes (obtain from almost any kindergarten classroom)

Procedure(s):
- Have the student place layer of blocks to cover bottom of box.
- What fraction of the capacity (volume) is filled?
- How many blocks were used?
- How many cubic inches do they represent?
- Fill the remainder of the box with the one-inch cubes.
- How many cubes were used in all?
- How many cubic inches represents the volume?
- Are we able to discover a short cut to counting in order to determine the volume?
- Lead the students to discover the following formula:

$$V = l \times w \times h$$

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7

Title: Demonstration of Volume of Rectangular Prism

Group Size: entire class, small groups

Materials: stack of rectangular cards, or dominoes, separate piles of congruent rectangles cut from wood or cardboard, overhead projector

Procedure(s):

- Place one rectangle on overhead projector--observe shape.
- Calculate surface area.
- Place others on top and observe that shape has not changed, but the object now has height.
- Demonstrate that the volume of the rectangular prism is a multiple of the volume of the first rectangle; thus, the volume is equal to the length times width (area) times height.
- In small groups, calculate volume of stacks of rectangles using formula V=lhw.

Title: The Rectangular Prism Problem

Group Size: partners

Materials: tagboard, masking tape, scissors, 1 cm cubes

Procedure(s):

- You and your partner have been assigned the task of constructing a rectangular prism whose volume is 300 cm^3.
- The base is a rectangle 4 cm by 15 cm.
- The measurement indicating the length of the altitude is lost.
- Your first task is to take the given data and compute the altitude of the rectangular prism.
- From tagboard draw a pattern for this rectangular prism. Put all the needed dimensions on your pattern.
- Now construct the prism.
- Place 1 cm cubes in your rectangular prism to prove it actually holds 300 of them.

Suggested Monitoring Procedures

Worksheet with rectangular prisms wherein the volume is given as well as two of the three dimensions. Students are to determine the missing dimension.

Possible Resources

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the volume of a cube is determined by multiplying side (edge) times side times side ($V = s \cdot s \cdot s$). B. The student knows a cubic unit shall be represented by unit^3 (cm^3, m^3, dm^3). C. The student is able to determine the volume of a cube given the length of one side. D. The student is able to determine the length of a cube side given the volume.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,4

Suggested Activities: Grade(s) 7-8

Title: Cubed

Group Size: three

Materials: two or more different game cards, chips or markers

Procedure(s):

- One player acts as caller. The purpose of this activity is to find the volume of cubes given the length of one side. It is played like Bingo. The caller draws a card giving a letter and a number, i.e., C5. The number is the length in units of one side of a cube. The player then must cube the called number or $5^3 = 125$, and place a chip on the C125 spot on his card (if he/she has such a spot) and so on until a winner is obtained.

C	U	B	E	D
27	512	64	1	343
125	64	125	343	64
216	343	FREE	27	216
512	1	125	216	512
64	729	1	1000	27

Caller Cards Needed:

C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10

U-1
U-2
U-3
U-4
U-5
U-6

B-1
B-2
B-3
B-4
B-5

E-1
E-2
E-3
E-4
E-5

D-1
D-2
D-3
D-4
D-5

Suggested Monitoring Procedures

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______

Title: Quiz Down
Group Size: four or more
Materials: none

Procedure(s):

- Have students divide into two teams.
- Each student must answer his/her question or he/she sits down. The last team standing is the winner.

Sample questions:

a. What does cm^3 mean?
b. What is the volume of a cube whose side is 5m long?
c. How do you find the volume of a cube?
d. If the volume of a cube is 27 cu. in., what is the length of one of its sides?

Title: The Best of All Cubes
Group Size: small group
Materials: clear, plastic decimeter cube, 1 cm cubes or 10 rods (10 cm^3) liter pitcher and water

Procedure(s):

- Estimate how many 1 cm cubes it will take to fill the plastic container.
- Have student write his/her estimate.
- Cover the base of his/her large cube.
- Count and record the number of cubes, that is, the number of cm^3.
- Determine how many layers of cubes will be needed to fill the large plastic container.
- Determine a short cut method of computing the volume, a method other than counting.
- Is the student able to write a short cut method as a formula?
- Which holds the most water, the plastic container, or the liter pitcher?
- Have the student prove his/her point.
- Have the student determine the true relationship between the two containers.

Suggested Monitoring Procedures

Teacher observation noting students who have difficulty with the concept. Group those students for reteaching.

Possible Resources

District Resources

Suggested Objective Placement 7-8

Student Learning Objective(s) A. The student knows the volume of a cylinder is determined by multiplying pi (π) times radius squared time height ($V=\pi r^2 h$). B. The student knows a cubic unit shall be represented by unit^3 (cm^3, m^3, dm^3). C. The student is able to determine the volume of a cylinder given the radius (or diameter) and height.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,4

Suggested Activities: Grade(s) 7-8	Suggested Monitoring Procedures	Possible Resources
Title: Calculate, Construct, and Demonstrate **Group Size:** pairs **Materials:** tagboard, masking tape, scissors, graduated liter pitcher, water. **Procedure(s):** • A cylinder that has never been constructed has a volume of 704 cm^3. It has a height of 14cm. The radius is unknown. • The students problem is to take the given data and to figure the radius. • From tagboard, have the student draw a pattern for the cylinder whose dimensions were given in part. • Have students put dimensions on the pattern, and construct this cylinder. • Have the student demonstrate to the class that the cylinder actually holds 704 cm^3 of water.	Teacher observation	District adopted text. **District Resources**

Suggested Activities: Grade(s) ________	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 7-8

State Goal	1
District Goal	
Program Goal	2,4

Student Learning Objective(s) A. The student knows the volume of a cylinder is determined by multiplying pi (π) times radius squared times height ($V = \pi r^2 h$). B. The student knows a cubic unit shall be represented by $unit^3$ (cm^3, m^3, dm^3). C. The student is able to determine the volume of a cylinder given the radius (or diameter) and height. D. The student is able to determine the radius, diameter or height of a cylinder given the volume and one dimension.

Suggested Activities: Grade(s) 7-8

Title: Demonstration of Volume of Cylinder

Group Size: entire class; small group

Materials: checks, poker chips, coins, records, other discs of equal diameter; overhead projector

Procedure(s):

- Place one disc on overhead projector.
- Do calculations for surface area of disc (πr^2).
- Place other discs on top.
- Have small groups of students calculate volumes using other discs any number high ($\pi r^2 \times h$).
- Have the students determine if the surface area of the circle has changed. If so, what has changed.
- Have the students determine how the surface area and the volume are related.
- Have the students determine the volume of one checker and then two checkers.
- Have the students determine a formula to calculate the volume of any cylinder.

Suggested Monitoring Procedures

On a worksheet print the formula for determining the volume of a cylinder. Students are to graphically show how to arrive at the formula as a follow-up of the activity.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

573

574

SUBJECT: Mathematics

SPECIFIC AREA: Graphs

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. a picture graph (pictograph) is a visual representation of a set of data where each picture represents an object.		K-1					
a. graphs which deal with whole numbers.		K-3					
b. graphs where picture represents other than whole numbers.		4-6					
. a bar graph is a visual representation of a set of data where one unit may represent 1, 2, 5 or 10 items.		2-3					
. a line graph represents data by specific points on a grid, the points being joined by lines to form a visual representation (or pattern).		2-4					
. an ordered pair of numbers identifies a point on a grid.	293	5-6					
. a double bar graph compares two sets of data.	293	5-6					
. a circle graph shows information in terms of percentage of a fraction of the whole.		6-7					
. a table is a collection of data displayed in a specific order according to its variables.		5-8					
. a vertical axis is the vertical line along which a coordinate is measured.		5-6					
. a horizontal axis is the horizontal line along which a coordinate is measured.		5-6					
coordinates are sets of numbers used to locate a point in space: (4, 3), (2, 1).	293	5-6					
The student is able to:							
. read and construct a picture graph (pictograph) from given and/or collected data (whole numbers).	293	K-3					
. read and construct a picture graph (pictograph) from given and/or collected data (whole numbers and fractional parts).		4-6					
. collect data.		2-4					
. order or rank collected data in the form of a table.		5-8					
. plot data from tables.		5-8					
*. read and interpret data on a simple bar graph.		2-4					
. read and interpret data on a multiple bar graph.	295	5-7					
*. construct a bar graph from given data or from collected data.		3-4					
. construct a multiple bar graph from given data or from collected data.	295	5-6					
*. construct a single line graph from given data or from collected data.		4-5					
. construct a multiple line graph from given data or from collected data.		6-8					
. read and interpret data on a circle graph.	299	6-7					
. construct a circle graph from given data or collected data.	299	6-7					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows an ordered pair of numbers identifies a point on a grid. B. The student knows a double bar graph compares two sets of data. C. The student knows coordinates are sets of numbers used to locate a point in space. (4, 3), (2, 1). D. The student is able to read and interpret data on a multiple bar graph. E. The student is able to construct a multiple bar graph from given data or from collected data.

State Goal	1
District Goal	
Program Goal	2,4,6

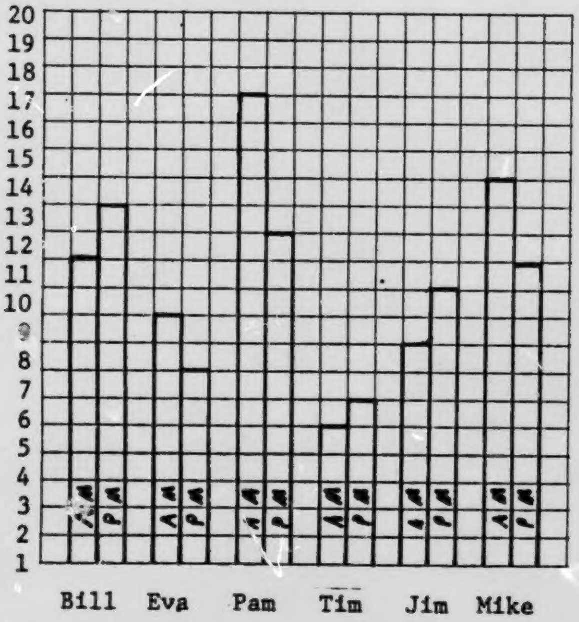
Suggested Activities: Grade(s) 7

Title: Double Tic-Tac-Graph
Group Size: pairs
Materials: paper, pencil, graph paper

Procedure(s):

- Students play twenty games of tic-tac-toe in the morning, twenty in the afternoon, keeping track of the winners or cat games.
- Then they construct a double bar graph to show the results.

Example:



Suggested Monitoring Procedures

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) 7

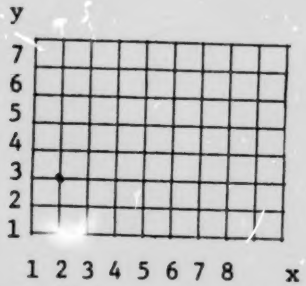
Variation: Have students from two classes polled as to their favorite sports, foods, colors and make appropriate graphs.
NOTE: Hangman or other short games could be used. also.

Title: Five in a Row
Group Size: entire class
Materials: overhead projector, transparency of an x-y coordinate grid, or worksheet with grid

Procedure(s):

- Explain terms before playing game.
- Divide students into two teams. To one team at a time, call two numbers from zero to ten, i.e., 2,3.
- Team members plot the two numbers on the grid, i.e. go two over on the x or horizontal axis and up three on the y or vertical axis, and mark the point where the two intersect.

Example:



- Students then multiply the two numbers, i.e., 2x3=6. If answer is correct, team gets to keep their mark on the grid. If answer is incorrect, mark is removed.
- The first team to set five marks in a row on the grid (horizontally, vertically or diagonally) wins the game.

Suggested Monitoring Procedures

Teacher observes responses and makes necessary corrections.

Possible Resources

District Resources

Suggested Objective Placement 5-7

Student Learning Objective(s) A. The student knows an ordered pair of numbers identifies a point on a grid. B. The student knows a double bar graph compares two sets of data. C. The student knows coordinates are sets of numbers used to locate a point in space. (4, 3), (2, 1). D. The student is able to read and interpret data on a multiple bar graph. D. The student is able to construct a multiple bar graph from given data or from collected data.

State Goal	1
District Goal	
Program Goal	2,4,6

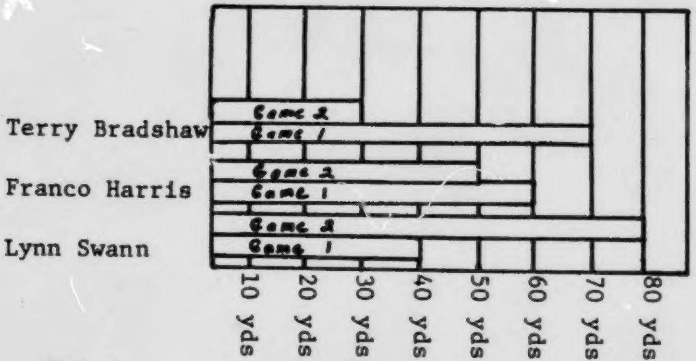
Suggested Activities: Grade(s) 7

Title:	Bar None
Group Size:	entire class
Materials:	graph paper grid already dotted, strips of colored construction paper (each with its own value: red=1 unit, blue=2 units, green=5, black=10, orange=20)

Procedure(s):

- Give each student a grid worksheet and a collection of the unit strips.
- Pick some familiar topic such as number of yards different football players carry the ball per game.
- Put data on board.
- Help students put amounts (units) on a horizontal axis and subjects on vertical axis.
- Then have students pick colored strips that would equal same number as data on board.
- Arrange largest colored strip on bottom, then in order, etc.

Example:



Suggested Monitoring Procedures

Teacher leads responses and helps, if necessary.

Possible Resources

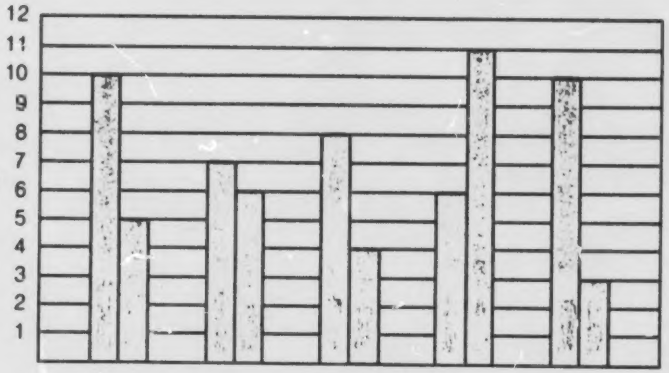
District Resources

Suggested Activities: Grade(s) 7

Title: Graph Greats
Group Size: entire class
Materials: graph worksheet without units and names but with bars and units marked

Procedure(s):

- Give pairs of students prepared graph worksheet. Have the bars and units marked but unnamed.
- Let students name and mark the bars and units so anyone can interpret the graph.
- When finished, students trade graph papers with other pairs of students.
- Then ask students questions that would apply to all graphs such as:
  What is the name of the graph?
  What are units?
  How does bar number 2 compare to bar number 5?
- Responses can be oral or students may write them on paper and then discuss.



Suggested Monitoring Procedures

Possible Resources

District Resources

SMALL SCHOO PROJECT - Working Copy

Suggested Objective Placement 6-8

Student Learning Objective(s) The student is able to construct a multiple line graph from given data or from collected data.

Related Area(s)

State Goal	1
District Goal	
Program Goal	2,4,6

Suggested Activities: Grade(s) 7-8

Title:
Group Size: entire class
Materials:

Procedure(s):

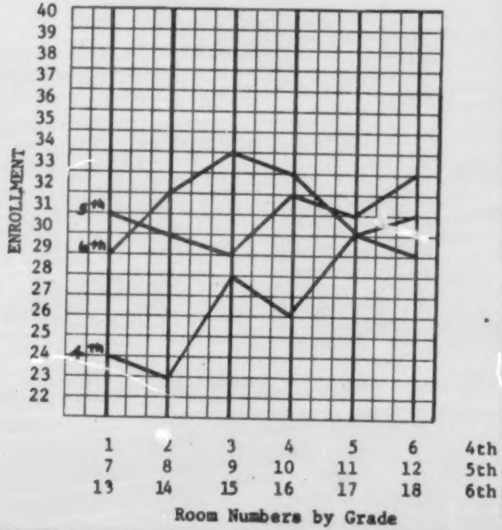
- Construct a multiple line graph showing the enrollments of each of the rooms in the building. It is suggested that only three grades be charted.

Example:

Room Enrollments

4th Grade	5th Grade	6th Grade
Rm. 1	Rm. 7	Rm. 13
2	8	14
3	9	15
4	10	16
5	11	17
6	12	18

4th Grade (Red)
5th Grade (Green)
6th Grade (Brown)



Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 6-7

Student Learning Objective(s) A. The student is able to read and interpret data on a circle graph.

B. The student is able to construct a circle graph from given data or collected data.

State Goal	1
District Goal	
Program Goal	2,4,6

Related Area(s)

Suggested Activities: Grade(s) 7

Suggested Monitoring Procedures

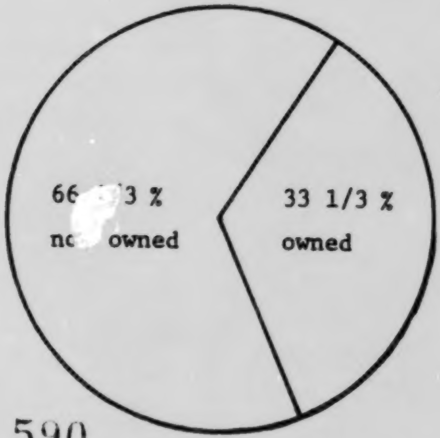
Possible Resources

District Resources

Title: Monopoly Graphing
Group Size: small groups
Materials: Monopoly game, paper, pencil, colors

Procedure(s):

- Have the students play a regular game of Monopoly for half an hour.
- Stop at the end of the half-hour and collect data: the amount of property owned by each individual, the amount not owned.
- Figure the percentages of owned and unowned property in relationship to all the property on the board.
- Construct a circle graph to illustrate data.



Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT - Working Copy

JECT: Mathematics

SPECIFIC AREA: Probability and Statistics

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. that probability is expressed in ratios which is a comparison.	303	6-8					
. the probability of an event can be expressed as a fraction (common) or a per cent.	303	6-8					
. that probability is the number of desired outcomes compared to the number of possible outcomes. Example: The probability of heads up if a coin is flipped. Number desired: 1 (heads). Number possible: 2 (heads or tails). Probability is 1/2 or 50%.		6-8					
. the average (mean) of a set of scores is found by dividing the sum of the scores by the number of scores.		4-8					
. the median of a set of scores is the middle scores when the scores are in numerical order.	305	6-8					
The student is able to:							
*. find the average of a set of scores.		4-6					
*. find the mean of a set of scores.		7-8					
*. find the median of a set of scores.	305	6-8					
find the probability of an event.	303	6-8					
The student values:							

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OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREIR EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ____________

Suggested Objective Placement 6-8

State Goal	1
District Goal	
Program Goal	1,4

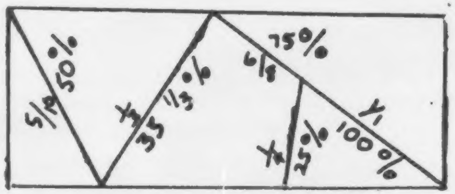
Student Learning Objective(s) A. The student knows that probability is expressed in ratios which is a comparison. B. The student knows the probability of an event can be expressed as a fraction (common) or a per cent. C. The student knows that probability is the number of desired outcomes compared to the number of possible outcomes. Example: The probability of heads up if a coin is flipped. Number desired: 1 (heads). Number possible: 2 (heads or tails). Probability is 1/2 or 50%. D. The student is able to find the probability of an event.

Suggested Activities: Grade(s) 7-8

Title: Probability Puzzle
Group Size: small groups of two or more
Materials: paper, ruler, scissors

Procedure(s):

- Have each student make a design like the one below. Each segment in the design should have a probability expressed as a fraction or ratio on one side and its per cent on the other side.



- Cut apart the design to make a puzzle.
- Have students trade puzzles and try to put them back together by matching probability fraction or ratio and its per cent.

Title: Probability Flip
Group Size: small groups of four to six
Materials: one coin for each student, one die per group

Procedure(s):

- Have the students flip the coin 100 times and keep data on the number of heads and tails.
- Have the students roll the die 100 times and keep data on the number of 1's, 2's, 3's, 4's, 5's and 6's rolled.

Suggested Monitoring Procedures

Give students a matching exercise using a ratio or fraction matched to a per cent, i.e.

___ 1/2 a. 40%
___ 1/4 b. 33 1/3%
___ 3/4 c. 50%
___ 1/3 d. 25%
___ 2/5 e. 20%
___ 5/8 f. 65%
g. 75%

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) 7-8

- Explain to students how to find probability. Probability is a number that expresses our degree of belief that an outcome will occur. The formula for probability is:

$$\text{probability} = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

- Ask them to compare the computed probability of flipping a coin and rolling a die. How close did they come?
- Give students problems on finding probability of an event, i.e.

Betty is going to choose a date from the month of January at random. Give the probability that she will choose January 13, 1/31; January 21, 1/31; January 9 and 10, 2/31; January 11, 12, 14; 3/31; a date consisting of two digits 22/31; a date with one in it 13/31; a date with three in it 5/31; a date with an even number 15/31.

Suggested Monitoring Procedures

Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows the median of a set of scores is the middle score when the scores are in numerical order. B. The student is able to find the median of a set of scores.

State Goal	1
District Goal	
Program Goal	1,4

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Median, Median
Group Size: entire class
Materials: overhead transparency, overhead

Procedure(s):

- Indicate to students that sometimes statisticians describe data by using the term median, which means the middle score.
- Note that the median has as many numbers above it as it has below it.
- Use a list of scores such as math scores of a class to show how the median score is obtained, i.e., math scores 74, 62, 96, 74, 51, 43, 89, 89, 76, 89, 95, 76, 100.

Example:

1. Arrange in order, lowest to highest:
   100
   96
   95
   89
   89
   89
   76 - median
   76
   74
   74
   62
   51
   43
2. Point out that in cases where there are two middle numbers, the median is the middle of the two numbers:

Suggested Monitoring Procedures

Observe teams noting students having difficulty with the concept. Group for reteaching.

Possible Resources

District adopted text

District Resources

Suggested Activities: Grade(s) _______

<u>Example:</u>

95
90
83
72
71 median is 71.5 or 77-1/2
64
41
40

- Divide students into groups of four to eight. Have each group line up in front of a desk. Place a packet of identical problems on each desk (at least two per person).
- Have the groups put the problems on the board with answers (in relay style).
- The first team through (all correct) is the winner.

Title: Puzzle of Averages
Group Size: entire class
Materials: worksheet of puzzle

Procedure(s):

- Give students the following puzzle, and indicate it is solved like a scrabble game, but has more liberal rules - read forward, backward, up, down.
- Ask students to record the number of times they find the words, mean, median, mode statistics, and sample in the game.
- Ask students which of the words occurs the median number of times; the mean, the mode.

Example:

```
            E D O M O D E
                  E
        S         D
    S T A T I S T I C S
M       M         A
O       P         N
D       L
E D O M E D I A N
      E
    N A E M O D E
      N   O
          D
          E
```

Suggested Monitoring Procedures

Possible Resources

District adopted text
Mathematics Around Us, Scott Foresman and Co., Palo Alto, Calif., 1975

District Resources

SMALL SCHOOLS PROJECT - Working Copy

JECT: Mathematics

SPECIFIC AREA: Measurement: Time

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. the names of the days of the week.		K-1					
. the names of the months.		1-2					
. the names of the months in sequence.		1-2					
. the short hand of the clock is the hour hand.		2					
. the long hand of the clock is the minute hand.		2					
. the term "minute" refers to a unit of time measurement.		2					
. the term "hour" refers to a unit of time equal to 60 minutes.		2					
. the basic units of time covered in K-3; hour (60 minutes), half-hour (30 minutes), quarter hour (15 minutes), five minute intervals.		4					
The student is able to:							
*. tell time to the hour.		1-2					
*. tell time to the half hour.		1-2					
*. tell time to the quarter hour.		2-3					
tell time by 5-minute intervals.		3-4					
*. write time in notation, i.e., 12:00, 12:30, 12:15, 12:55.		1-4					
. tell time in minutes from both clock face and digital.		4					
. use p.m. and a.m. notation in writing times.		4					
*. convert a unit of time to another unit (hours, minutes, seconds, days, weeks, months, years).		4-8					
. compute time intervals between two times.	309	4-8					
. read time charts.	309	4-8					
. solve work problems.	311	4-8					
The student values:							
. estimation as a useful skill in time measurement.		K-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ______

SMALL SCHOOLS PROJECT

Suggested Objective Placement 4-8

Student Learning Objective(s) A. The student is able to compute time intervals between two times.

B. The student is able to read time charts.

State Goal	1
District Goal	
Program Goal	1,2,3, 4

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Time to Travel
Group Size: small groups
Materials: per group: Greyhound time table, paper to keep track of travel, map of Pacific Northwest

Procedure(s):

- Each group is given three days (72 hours) to travel around the Pacific Northwest.
- They are to keep track of the time they are traveling and the time between travel. At the end of the third day, they must return to their starting point.
- The group which has spent the most time on the bus and the least amount of time waiting is the winner.

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOL PROJECT

Suggested Objective Placement 4-8

Student Learning Objective(s) The student is able to solve work problems.

State Goal	1
District Goal	
Program Goal	6

Related Area(s)

Suggested Activities: Grade(s) 7-8

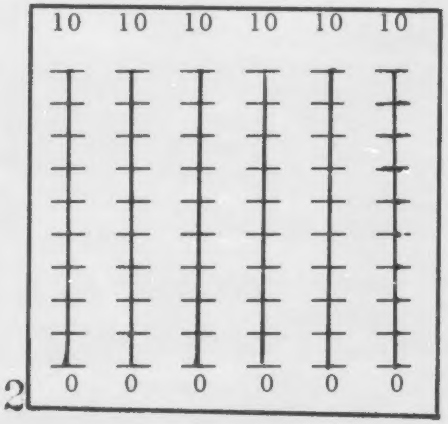
Title: Move On
Group Size: small groups (two to six each)
Materials: game board, six problem folders (containing 30 numbered problems each), answer card for each folder, markers (one per student), spinner marked 1-30

Procedure(s):

- Each student in the group draws a problem folder and another student takes his/her answer card.
- In turn they spin the spinner and work the problem indicated (no repeats).
- Score +1 point for correct answer, -2 for incorrect answer. Move the appropriate number of spaces for each spin and answer.
- First person scoring ten wins.

Example:

Game Board



Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) _______	Suggested Monitoring Procedures	Possible Resources
		District Resources

SUBJECT: **Mathematics**

SPECIFIC AREA: **Measurement: Money**

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7	8
The student knows:							
. the basic units of money covered in K-3; penny, nickel, dime and quarter, half-dollar, dollar.		4-6					
The student is able to:							
. write the value of money equal to or less than $1,000.00		4-6					
*. count change totaling less than $20.00, beginning with a certain value.		4-6					
. determine if the amount of change received from a purchase is correct.		4-6					
. make purchase and change from $100.00 or less.		4-6					
*. add and subtract two money values using dollar and cents notation.		4-6					
. solve money problems using money by use of multiplication or division.		4-6					
. multiply or divide a given amount of money.		4-6					
. estimate money to the nearest dollar.		4-6					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________

SMALL SCHOOLS PROJECT - Working Copy

JECT: Mathematics

SPECIFIC AREA: Measurement: Metric Linear

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
*. the abbreviation for the commonly used metric units of lengths: mm — millimeter, cm — centimeter, m — meter, km — kilometer.		4-6					
. the less commonly used metric units of lengths: dm — decimeter, dam — decameter, hm — hectometer.		4-6					
. the prefix meaning: milli--1/1000, centi--1/100, deci--1/10, deca--10, hecto--100, kilo--1000.		4-6					
. meter may also be spelled metre.		4-6					
. the term millimeter refers to 1/10 of a centimeter and 1/1000 of a meter.		4-6					
. the term centimeter refers to 1/100 meter and 10 millimeters.		4-6					
. the term decameter refers to 10 meters.		4-6					
. the term hectometer refers to 100 meters.		4-6					
The student is able to:							
. identify the unit of measurement most appropriate for a given task.		4-5					
*. measure a specific length to the nearest mm, cm, m.		4-6					
estimate to within ±20% lengths of familiar objects in mm, cm, and m.		4-6					
. use the meter stick to measure to the nearest mm, cm.		4-6					
. convert from one linear measurement to another linear measurement within the metric system.		5-6					
. distinguish which units are more precise.	317	6-8					
. round to the least precise measurement for computational purposes.	317	6-8					
The student values:							

SUBJECT: **Mathematics**

SPECIFIC AREA: **Measurement: Linear**

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. the term "centimeter" refers to a metric unit of linear measurement.		1					
. the term "inch" refers to an English unit of linear measurement.		1					
. the term "meter" refers to a metric unit of linear measurement equal to 100 centimeters or 10 decimeters.		2					
. the term "foot" refers to a unit of linear measurement equal to 12 inches.		2					
. the term "yard" refers to a unit of linear measurement equal to three feet or 36 inches.		2					
. the term "half-inch" is a unit of linear measurement.		3					
. the term "quarter-inch" is a unit of linear measurement.		3					
. two quarter-inches equal one half-inch.		3-4					
. four quarter-inches equal one inch.		3-4					
. four quarter-inches equal two half-inches.		3-4					
. the term "kilometer" is a metric unit of linear measurement.		3-4					
. the term "perimeter" refers to the linear measurement around a given space (geometry).		3-4					
. the term "mile" is an English unit of linear measurement used to indicate distance.		3-4					
The student is able to:							
*. compare size using the following terms: longer, smaller, largest, smallest, taller, tallest, longest, shortest, same.		K-1					
*. measure an object(s) using centimeters.		1					
*. measure the length of an object(s) using inches.		1					
*. measure length using a meter stick.		2					
*. measure length using a foot ruler.		2					
*. measure length using a yardstick.		2					
*. estimate lengths.		2-3					
. measure a specific length to the nearest half-inch.		3-4					
. measure a specific length to the nearest quarter-inch.		3-4					
. measure the perimeter of a simple geometric figure.		3-4					
. compute distance in miles.		3-4					
The student values:							

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student is able to distinguish which units are more precise.

B. The student is able to round to the least precise measurement for computational purposes.

State Goal	1
District Goal	
Program Goal	1,2,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: How Big?
Group Size: small groups
Materials: sets of twine cut to specific metric lengths, task cards

Procedure(s):

- Teacher makes sets of twine metric linear measures and labels them.
- The teacher assembles sets in packets.
- Specify that objects are to be measured in more than one unit, and that items can be measured by combinations of measures, i.e., meters and cm.

Example:

TASK CARD

Measure how high, then how wide the following items are: door, window and the teacher's desk. Express the measure in metres and centimeters.
If the measure were rounded off to the most precise unit what unit would it be?

Suggested Monitoring Procedures

Teacher checks completed task cards.

Possible Resources

District adopted text.

District Resources

Suggested Activities: Grade(s) ______

Title: Measure with Metrics
Group Size: small group, entire class
Materials: meter sticks, centimeter ruler, a variety of items to measure, i.e., paperclip, empty .22 caliber casing, baseball, cookie, stick of chewing gum, BB, room, baseball bat, etc.

Procedure(s):

- Give students a worksheet with a list of items to measure.
- Have students write in what measuring unit they should use to measure the item, i.e., meter stick, centimeter ruler.
- Have students estimate the length of the item, then measure it and check their estimates.

Example:

Item	measuring unit selected	estimate	measurement
baseball bat	meter stick	3/4 meter	1 meter
pencil	centimeter ruler	10 cm.	17 cm.

Suggested Monitoring Procedures

Possible Resources

Basic Metric Measurement Skills, Lola May and Vernon Hood, Media Research Associates, 1976

District Resources

SUBJECT: Mathematics

SPECIFIC AREA: Measurement: Metric Capacity

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
*. the abbreviation of the commonly used metric units of capacity (volume): ml - milliliter, l - liter.		4-6					
. the abbreviation for the less commonly used metric units of capacity: cl - centiliter, dl - deciliter, dal - decaliter, hl - hectoliter.		4-6					
. the prefix meanings: milli---1/1000, centi---1/100, deci---1/10, deca---10, hecto---100, kilo---1000.		4-6					
. liter may also be spelled litre.		4-6					
. the term milliliter refers to 1/1000 of a liter.		4-6					
The student is able to:							
. use the graduated cylinder to measure to the nearest ml and l.		4-6					
*. use l and ml to measure liquids.		4-6					
. estimate capacity to within ±20% of the capacity.		4-6					
convert from one measurement to another measurement within the metric system.		5-6					
. distinguish which units are more precise.	321	6-8					
NOTE: for cubic measurement of volume see GEOMETRY.							
The student values:							

SUBJECT: **Mathematics**

SPECIFIC AREA: **Measurement: Capacity (Volume)**

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. the term "liter" refers to a metric unit of volume measurement.		1-3					
. the terms "cup," "pint," "quart" and "gallon" refer to units of capacity measurement.		1-3					
. two cups equal one pint.		1-4					
. four cups or two pints equal one quart.							
The student is able to:							
. measure capacity using the liter as the unit of measurement.		1-3					
* . measure capacity using a "cup," "pint," "quart," or "gallon" as the unit of measure.		1-3					
The student values:							

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Suggested Objective Placement 6-8

Student Learning Objective(s) The student is able to distinguish which units are more precise.

State Goal	1,6
District Goal	
Program Goal	2,4,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Metric Measures
Group Size: small group, entire class
Materials: sets of containers

Procedure(s):

- Point out to students that in metric capacity the basic units are the liter (1) and the milliliter (ml). Metric cups are also used as an aid in measuring.
- Show students a chart for comparison as follows:

  1000 milliliters = 1 liter
  250 milliliters = 1 metric cup
  4 metric cups = 1 liter

- Have students measure liquid and dry items refering to the chart when necessary, i.e., water, sand, flour, cornmeal, juice.
- Give students a worksheet and have them express answers in the most precise metric terms.

Example(s):

1. A recipe calls for 1/5 metric cup: how many milliliters are needed? (50 ml)
2. How many metric cups are 1-1/2 liters? (6 ml)
3. Measure two metric cups of juice. How many milliliters is that? (125 ml) How many liters? (1-1/2 1)

Suggested Monitoring Procedures

Have students choose the most sensible measure:

1. milk carton
   2 ml 2 1
2. juice pitcher
   25 ml 1 1
3. sack of cornmeal
   380 ml 5 1
4. one metric cup of water
   250 ml 1 1
5. cottage cheese box
   125 ml 3 1

Possible Resources

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

629

630

SUBJECT: Mathematics

SPECIFIC AREA: Measurement: Metric Weight

	Page	Suggested Grade Placement	District Placement				
			4	5	6	7'	8
The student knows:							
*. the abbreviation for the commonly used metric units of weight: mg - milligram, g - gram, kg - kilogram.		4-6					
. the less commonly used metric units of weight: cg - centigram, dg - decigram, dag - decagram, hg - hectogram.		4-6					
. the prefix meanings: milli - 1/1000, centi - 1/100, deca - 10, hecto - 100, kilo - 1000.		4-6					
. the term "gram" refers to weight.	325	4-6					
. the term "kilogram" refers to 1000 grams.	325	4-6					
. the term "milligram" refers to .001 grams.		4-6					
. the term "metric tonne" refers to 1000 kilograms.	325	6-8					
. the difference between mass and weight.		8					
The student is able to:							
. identify the unit of measurement most appropriate for weighing a given object.		4-5					
*. measure the weight of an object to the nearest gram.		4-6					
estimate within ± 20% the weight of a familiar object.		4-6					
use a balance scale to weigh objects.		4-6					
. convert from one unit of weight to another unit of weight within the metric system.		5-6					
. distinguish which units of weight are more precise.	329	6-8					
The student values:							

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OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________________

Suggested Objective Placement 6-8

Student Learning Objective(s) A. The student knows the term "gram" refers to weight. B. The student knows the term "kilogram" refers to 1000 grams. C. The student knows the term "metric tonne" refers to 1000 kilograms.

State Goal	1
District Goal	
Program Goal	2,4

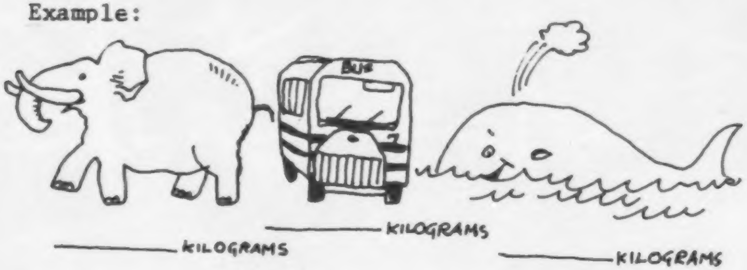
Related Area(s)

Suggested Activities: Grade(s) 7-8

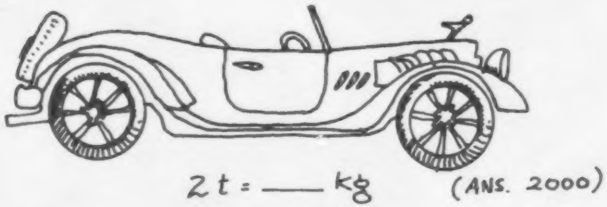
Title:
Group Size: entire class
Materials: worksheet

Procedure(s):

- Explain that 1000 kilograms equal 1 metric tonne.
- Give students worksheets illustrated with heavy objects. Include the weight in kilograms beneath each illustration.
- Students round the weight to the nearest metric tonne.
  Example:



- **Variation:** Give students weights reported in metric tonne and have them convert to kilograms.
  Example:



Suggested Monitoring Procedures

Teacher observation.

Possible Resources

Kit: "Metric Measurement", Educators Library of Media for Staff Development, vol. 3
1976
ESD Catalog

F: "Metre and Litre are Neater"
ibid.

District Resources

Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

Suggested Objective Placement 8

Student Learning Objective(s) The student knows the difference between mass and weight.

State Goal	1
District Goal	
Program Goal	2,4

Related Area(s) Science

Suggested Activities: Grade(s) 8

Title: Other Planets
Group Size: small group or entire class
Materials: world almanac, encyclopedia, science text

Procedure(s):

- Have students develop a chart of the planets with columns for distance from the sun, mass, force of gravity and student mass and weight.
- Use science text, almanacs, encyclopedias to obtain the needed information.
- Have students convert gravitational pull of other planets in relationship to the earth to determine their weight on the various planets.
- NOTE: The chart will indicate that weight will vary on each of the planets whereas mass remains constant. Example:

Planet	Mass	Distance from Earth	*Gravitational pull at surface (Earth = 1)	Student Mass	Student Wt.
Mercury					
Venus					
EARTH					
MARS					
JUPITER					
Saturn					
Uranus					
NEPTUNE					
Pluto					

*NOTE - The gravitational pull on the surface may be given in different terms in references. The teacher may want to use a common set of figures for this chart.

Suggested Monitoring Procedures

Peruse student charts to check their knowledge of the concept.

Possible Resources

Science Instructor

District Resources

Suggested Activities: Grade(s) 8

Title: From Here to Outer Space
Group Size: small group, entire class
Materials: cartoon, reference books

Procedure(s):

- Point out that in common usage the term weight is used when mass is measured. Actually, weight is a measure of gravitational force exerted by a planet on an object whereas mass is a measure of the amount of matter in an object. Weight varies while the mass of an object does not. For instance, on the moon a person would weigh less than on earth but the mass of the person would be the same in both places.
- Student uses cartoon and finishes worksheet.
- The student finds relative weights for given weights on the different planets.

  Example:

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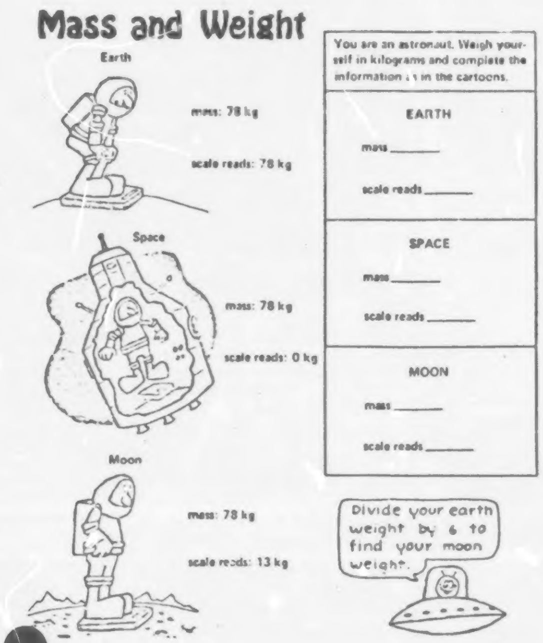

Mass and Weight

You are an astronaut. Weigh yourself in kilograms and complete the information as in the cartoons.

EARTH

mass ______

scale reads ______

SPACE

mass ______

scale reads ______

MOON

mass ______

scale reads ______

Earth
mass: 78 kg
scale reads: 78 kg
Space
mass: 78 kg
scale reads: 0 kg
Moon
mass: 78 kg
scale reads: 13 kg
Divide your earth weight by 6 to find your moon weight.

Suggested Monitoring Procedures

Possible Resources

Metric Ease, Carne Bennett

District Resources

Suggested Objective Placement 6-8

Student Learning Objective(s) The student is able to distinguish which units of weight are more precise.

State Goal	1
District Goal	
Program Goal	2,4

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Heads or Tails?
Group Size: small group
Materials:

Procedure(s):

- On a sheet of paper write the names of all players across the top of the page. Down the left margin write the names kilogram, hectogram, decagram, gram, decigram, centigram and milligram.
- A numeral such as 435.678 is written before the game starts and represents a measure of 435.678 grams. (Use a six-digit numeral).
- Five coins are flipped simultaneously and the first player can then choose to move the decimal point to the right as many places as he/she has "heads" showing or to the left as many places as he/she has "tails" showing.
- In no case may player form a numeral that requires the addition of zeros to place the decimal point the proper number of places.
- If a movement to the right or left cannot be accommodated with the results of his/her coin toss, player must pass.
- After the decimal point has been moved the player must correctly identify the new measure name in terms of the previous name.
  For example: If the original number represented a measure of 435.678 grams and the player chose to move the decimal three places to the right, the new number would represent a measure of 435.678 milligrams.

Suggested Monitoring Procedures

Possible Resources

Let's Play Games in Metric, Henderson, National Textbook Co.

District Resources

Suggested Activities: Grade(s) 7-8

- If player correctly identifies the new measure he/she places a check (✓) under his/her name across from the proper measure (milligram).
- The play then moves to the next person, who begins with the measure 435.678 milligrams and flips the coins to determine the placement of the decimal point.
- Play continues in this manner until someone has completed checking all the measure names listed on the scoresheet.
- The first player to do this is the winner.
- Players will develop various strategies to move the decimal point to complete their columns and to block the completion of their opponents' columns.

Suggested Monitoring Procedures

Possible Resources

District Resources

[illegible]JECT: Mathematics

SPECIFIC AREA: Measurement: Metric Temperature

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. degree Celsius is used to measure temperature.		3-4					
*. Celsius and Centigrade are the same.		3-4					
. the abbreviation for Celsius is C.		3-4					
*. common temperature references: 0°C is freezing point of water, 37°C is normal body temperature, 100°C is boiling point of water.	333	3-4					
The student is able to:							
*. read a thermometer.	333	4-8					
*. calculate differences in degrees.	335	4-8					
The student values:							

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________

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Suggested Objective Placement 3-8

Student Learning Objective(s) A. The student knows common temperature references: 0°C is freezing point of water, 37°C is normal body temperature, 100°C is boiling point of water. C. The student is able to read a thermometer.

State Goal	1
District Goal	
Program Goal	1,2,4,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Celsius Bingo
Group Size: small group, entire class
Materials: blank Bingo cards, 3" x 5" cards with descriptions of temperatures

Procedure(s):

- Teacher writes a list of common Celsius temperatures on chalkboard.
- Students prepare Celsius Bingo cards by writing the temperatures in the blank squares in any order.
- Teacher (or student) reads temperature descriptions from 3" x 5" cards and students cover the corresponding temperatures on Bingo cards with some sort of marker. (One card at a time.)
- Student first covering a row horizontally, diagonally or vertically wins.

Example:

Temperatures on Bingo Cards	Temperature descriptions on 3"x5" cards
100°C	water boils
37°C	normal body temp.
0°C	water freezes
28°C	summer day
82°C	car radiator
52°C	drinkable tea
-1°C	winter day

- Other temperatures that can be used are:
  outdoor sport weather - football, soccer, etc.
  water in a fish bowl
  oven temperature for baking brownies

Suggested Monitoring Procedures

Possible Resources

District Resources

Suggested Activities: Grade(s) ______

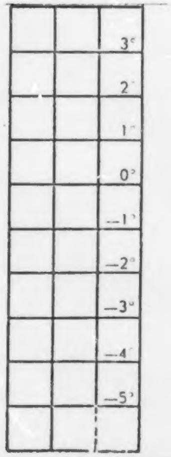
Title: Celsius Temperatures
Group Size: entire class
Materials: centimeter graph paper

Procedure(s):

- Have students construct a Celsius thermometer by doing the following:
- Students draw on centimeter graph paper a number line 110 cm long. Have them make the thermometer 3 cm wide. (Add strips of graph paper if necessary to make strip long enough.)
- Students number each line starting at -5°C at the bottom, and numbering by ones to the top of the thermometer. (Position thermometer vertically when writing numbers.)
- Have students mark on thermometer the following degrees:

body temperature	37°C
boiling H_2O temperature	100°C
freezing temperature	0°C
summer day	28°C
winter day	-1°C
fish bowl temperature	__
oven temperature for baking brownies	__

Example:



Suggested Monitoring Procedures

Teacher observation.

Possible Resources

Metric Tasks, Skill Developmental Activities, Marilyn Sue Corey, Love Publishing Co., Denver, Colo. Task 36.

District Resources

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Suggested Objective Placement 3-8

Student Learning Objective(s) A. The student knows common temperature references: $0^{\circ}C$ is freezing point of water, $37^{\circ}C$ is normal body temperature, $100^{\circ}C$ is boiling point of water. B. The student is able to calculate differences in degrees.

State Goal	1
District Goal	
Program Goal	1,2,4,6

Related Area(s)

Suggested Activities: Grade(s) 7-8

Title: Celsius Subtract
Group Size: small groups
Materials: oak tag temperature spinners (as shown below)

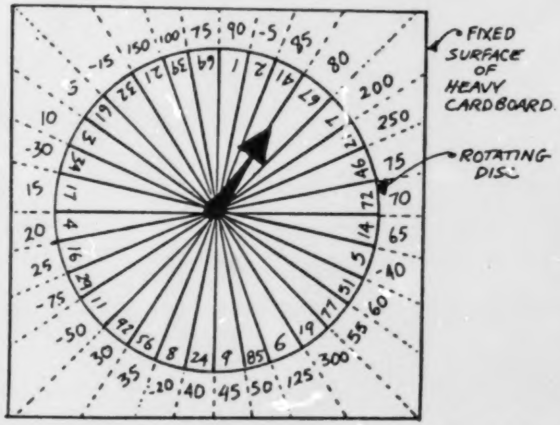
Procedure(s):

- Construct spinner(s) as illustrated below.
- Students in small group take turns spinning.
- Students calculate net difference in degrees Celsius by subtracting number on rotating disc from number on fixed surface that spinner lands on. (Teacher may need to check answers.)
- If answer is correct, student counts that answer as points.
- If answer is incorrect, student subtracts that answer from total points.
- Student accumulating 500 points first wins.

Variation:

- The center disc can be rotated to introduce new subtraction facts.

Example:



Suggested Monitoring Procedures

Possible Resources

District Resources

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Suggested Activities: Grade(s) ______	Suggested Monitoring Procedures	Possible Resources
		District Resources

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BJECT: Mathematics

SPECIFIC AREA: Measurement: English

	Page	Suggested Grade Placement	District Placement 4	5	6	7	8
The student knows:							
. the basic units of the English system of linear measurement and their abbreviations: in.--inch, ft.--foot(feet), yd.--yard, mi.--mile.		4					
. the basic units of the English system of volume and their abbreviations: c.--cup, pt.--pint, qt.--quart, gal.--gallon.		4					
. the basic units of the English system of weight and their abbreviations: oz.--ounce, lb.--pound, t.--ton.		4					
. the basic unit of temperature is Fahrenheit and the common reference freezing of water is 32°, body temperature is 98° and boiling water is 212°.		4-6					
The student is able to:							
. maintain the skills learned in grades K-3.		4-8					
The student values:							

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OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER ________________